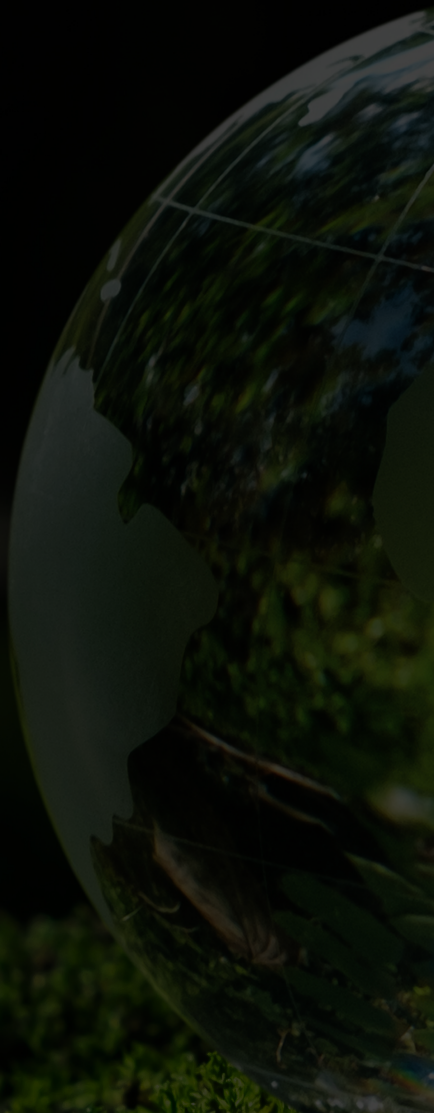
kraken

Sustainability indicators for crypto-assets

Disclosures in accordance with Article 66 (5) MiCAR.



This report was provided by Crypto Risk Metrics.

2026-02-03

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Preamble

About the Crypto Asset Service Provider (CASP)

Name of the CASP: Payward Global Solutions Limited
Street and number: 70 Sir John Rogerson's Quay
City: Dublin
Country: Ireland
LEI: 9845003D98SCC2851458

About this report

This disclosure serves as evidence of compliance with the regulatory requirements of MiCAR 66 (5). This requirement obliges crypto asset service providers to disclose significant adverse factors affecting the climate and the environment. In particular, this disclosure complies with the requirements of "Commission Regulation (EU) 2025/422 of December 17, 2024, supplementing Regulation (EU) 2023/1114 of the European Parliament and of the Council with regard to regulatory technical standards specifying the content, methods and presentation of information relating to sustainability indicators related to climate-related and other environmental impacts." The optional information specified in Article 6, par. 8 (a) to (d) DR 2025/422 is not included.

This report is valid until material changes occur in the data, which will result in an immediate adjustment of this report.

Overview

This is an overview of the core indicator energy consumption but does not represent the reporting according to MiCAR 66 (5). Please find the full disclosure below.

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
1	Bitcoin	V15WLZJMF	146,363,234,697.80
2	Dogecoin	35PLJP6J7	5,538,165,186.77
3	Kaspa	/	2,831,162,818.96
4	Bitcoin Cash	919BF3W7L	1,219,352,470.27
5	Litecoin	D74JZ1VRD	794,702,264.04
6	Ethereum Classic Ether	DGMQMFZD4	534,728,489.76
7	Zcash	7JPSSTXMS	322,297,410.11
8	DOG•GO•TO•THE•MOON	/	155,242,360.41
9	Siacoin	766NMMLMQ	87,614,336.89
10	Quai	/	84,796,800.00
11	Dash	PPDH6B273	67,500,000.80
12	EthereumPOW	N1NLFX5KR	55,531,950.69
13	MAGIC INTERNET MONEY	RQPCRN3VN	49,153,256.28
14	Lobo Dot The Dot Wolf Dot Pup	/	22,938,185.18
15	Pups Dot World Dot Peace	/	18,432,477.00

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
16	billy	/	16,384,419.03
17	Solana SOL	6QZ1LNC12	6,843,750.00
18	Stacks	PQTGLSGRG	6,586,345.56
19	Internet Computer Token	4DHTM5D7P	5,834,160.00
20	TRON TRX	HZ9HHNPLG	4,027,257.72
21	Filecoin	S6702SWRZ	2,409,026.69
22	Ethereum Eth	D5RG2FHH0	2,159,953.20
23	Qubic	/	1,909,680.00
24	Toncoin	KK12JMBTX	1,419,120.00
25	NEAR Protocol	MXXM59Z0T	919,965.48
26	Avalanche AVAX	S6JCBF70N	818,291.21
27	Cardano ADA	76QS7QCXB	773,946.00
28	MultiversX EGLD	H1V5PHW7P	716,130.45
29	Polkadot DOT	SGD9NLTRG	630,720.00
30	Flow	6T49BCSXZ	526,695.00
31	USDC	TJWK5QTRK	510,300.01
32	Kusama	PX4GCX5B5	474,616.80
33	Ripple XRP	42PHJB2BS	456,288.08
34	Arweave	CPX6BGPR0	437,562.00
35	Algorand	K8S6W74KS	420,961.80
36	Sui	64RFW3D8P	394,725.60
37	EOS	8FWQPDTGZ	344,268.34
38	Merlin	NW1M13H3L	307,362.79
39	Tezos	FLJPFR9RS	282,247.45
40	Wallet Connect	/	269,238.60
41	Saga	/	262,800.00
42	Aptos Coin	C4CQCGLH2	262,800.00
43	Berachain BERA	L7XQXLN44	244,404.00
44	Injective Token	92M9B0DZ7	242,127.47
45	KAVA	2HZXZQLKX	236,682.94
46	SEI	XCDVP53WR	210,305.17
47	Cosmos ATOM	6C7F2WVZH	186,483.56
48	canton	/	184,222.80
49	Terra	8SDRWQDG7	183,960.00
50	Flare	DVRV6HSK5	170,820.00

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
51	nillion	/	170,294.40
52	autonomys	/	144,540.00
53	Terra Classic	D444MB2WJ	131,400.00
54	ICON	P3JS307D2	115,106.40
55	Neutron	MB670B1M8	113,135.40
56	Cronos	GWM30MLW3	110,051.29
57	XDC Network	2DHMJ018G	105,120.35
58	Polygon POL	GB8DQ8DWN	96,916.72
59	Qtum	SH1MLXP1W	91,191.60
60	Binance Coin	8N2VXJKB1	90,228.00
61	Sonic	7JBMLCWCR	84,358.80
62	BSquared Network	1R9JFC50Z	84,353.12
63	Hedera HBAR	2WWB8QS47	82,125.00
64	Mina	133H6VJ48	81,205.20
65	Celestia	M7NN4STH9	80,791.98
66	Akash	/	79,628.40
67	Energy Web Token	VW0Z4C80S	79,628.40
68	ROSE	SXGLQRF6T	79,368.23
69	Fantom	GRLPK02K7	78,840.00
70	SNEK	BWXFZFFGQ	68,795.20
71	Dymension	/	65,891.35
72	Moonbeam	K4HV4GN5K	65,700.00
73	Osmosis	TDS6NVZ46	65,180.92
74	constellation	/	63,334.97
75	Story	BVZJV41L8	59,130.00
76	Mantle	QH1GF1J5H	53,483.09
77	Monad	/	53,348.40
78	Stellar Lumen	ZCN8SR2H7	52,560.00
79	Acala	SJ2DGCXR7	52,560.00
80	initia	5H84WFH8T	40,602.60
81	Concordium	ZBF05NGN7	40,208.40
82	babylon	/	40,208.40
83	VeChain	M2DJLNPDW	39,946.57
84	Xion	HFKC0NXKJ	39,814.20
85	Celo	VWWMVDM0J	39,420.00

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
86	MANTRA	11B60HRDS	33,579.39
87	Lisk	7J6VRX7JZ	32,850.00
88	Secret	93XJT88VH	31,536.00
89	hydration	/	30,747.60
90	Kinto	/	30,222.00
91	u_two_u	/	28,777.66
92	zkVerify	/	28,119.60
93	Wrapped BTC	Z1K7V8BV8	27,322.19
94	THORChain	426HSHMDM	26,805.60
95	JUNO	VDPRP0FHT	26,417.92
96	Moonriver	KW2NCBQ6M	26,280.00
97	Zeta	9BJJBHB21	25,602.18
98	Bittensor	LBQFC0FVK	25,228.80
99	PEAQ	5ZCF8MLPL	24,966.00
100	Chiliz	KNS06KRXQ	23,299.50
101	Paxos Gold	RPGFC7GN3	23,023.88
102	union	/	22,352.33
103	Nano XNO	54PWFZNFT	21,549.60
104	Metis Token	RCGXTQ3G0	21,223.74
105	Songbird	1GB15J049	21,024.00
106	karura	/	20,498.40
107	althea	/	20,104.20
108	Shiden Network	2HQFBDLXV	20,104.20
109	Boba Token	L7CKSKP8K	19,791.85
110	gunz	/	19,739.90
111	zero_g	/	18,950.65
112	Ab Chain	/	18,396.00
113	nodle	/	17,843.40
114	Matchain	RKVDPH4BZ	17,607.60
115	Movement	11KGBJ2W4	16,067.82
116	stride	/	16,030.80
117	basilisk	/	13,797.00
118	plasma	/	13,435.08
119	Astar	87L5SX99N	13,140.00
120	analog	/	13,009.10

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
121	altair	/	13,008.60
122	hashkey_chain	/	12,128.95
123	Linea	DW1NCGR64	10,968.58
124	Tac Token	/	10,359.58
125	paycoin	/	10,249.41
126	adi	/	9,563.56
127	memecore	/	9,463.50
128	kujira	/	9,204.89
129	delorean	/	9,078.69
130	ChainLink Token	3R3J70FDR	9,069.32
131	Parallel Finance	/	9,066.60
132	integritee	/	8,677.58
133	acurast	/	8,278.20
134	IAGON	/	7,739.46
135	kintsugi	/	6,701.40
136	Balancer	Q8QDMDD7D	6,612.91
137	ZKsync	BCBLPFRBX	6,570.58
138	KILT	/	6,307.20
139	build_on_bitcoin	/	5,525.47
140	Curve DAO Token	P8DXFQ5LD	4,224.21
141	open_ledger	/	4,080.39
142	Velodrome	3QN6WNR4L	3,864.86
143	Aave Token	H618RN577	3,342.15
144	interlay	/	3,153.60
145	Axie Infinity Shard	RTTDS5MHT	2,836.39
146	SHIBA INU	M4HFTFNPC	2,831.10
147	Sui Name Service	/	2,763.08
148	Uniswap	XMB84LZBZ	2,631.06
149	Pepe	J41R6PF81	2,518.15
150	Walrus	VDK0388GB	2,239.58
151	Deepbook Protocol	/	2,239.58
152	sky	/	2,194.36
153	Ondo	WKH09L3DV	2,136.48
154	fly	/	2,108.97
155	solana_mobile_seeker	/	2,084.43

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
156	seeker	/	2,084.43
157	sentient	/	2,016.68
158	Pendle	5RJT6339X	1,991.99
159	scallop	/	1,973.63
160	lofi	/	1,973.63
161	Euro Coin	/	1,886.10
162	Memecoin	THW1BFN8J	1,817.44
163	PancakeSwap	LZ3V3Z6FD	1,746.06
164	cyber	/	1,720.09
165	moonwell	/	1,647.42
166	Pump.fun	C2F189JNL	1,560.55
167	tbtc	/	1,478.46
168	ENA	SPRSCSVSW	1,433.85
169	DuckChain Token	91C5G6GWN	1,419.12
170	Onyxcoin	XSGP9L77X	1,387.80
171	1INCH Token	SVRFHQRZN	1,379.56
172	SPX6900	V9FVRLGKC	1,340.97
173	Artificial Superintelligence Alliance	/	1,182.40
174	Convex Token	MDLR8VGRS	1,156.37
175	Lucky Kat	/	986.81
176	Worldcoin	BJD0TZ8V1	982.52
177	Star Atlas	/	946.86
178	LayerZero	C0HH6QTBN	941.66
179	Quant	L8M8X31JL	926.20
180	Mog Coin	/	899.97
181	Eigen	QRLFSB800	884.64
182	Jito Staked SOL	QF1G0XXMM	803.54
183	Morpho Token	CH7NXRXR1	797.57
184	Fartcoin	Z673VT588	778.55
185	Frax Share	BWNWXP3R1	759.19
186	Stronghold SHx	Z9XPPVGGK	753.14
187	Clearpool	J2N57NP8S	734.90
188	Wrapped Eth	/	706.94
189	Lido DAO Token	8W8GLGL65	697.57
190	yieldbasis	/	689.82

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
191	Magic Internet Money	/	679.49
192	Beam	X70FVW3GT	656.93
193	ApeCoin	7WKVRWPNR	633.44
194	CoW Protocol Token	SF0HRQBH7	606.81
195	Arbitrum	44TP35HF9	579.06
196	multibank	/	578.93
197	ether.fi governance token	RJTJR45MC	576.38
198	Render Token	XR0JSKLNZ	565.44
199	Graph Token	VMQPVH41W	556.59
200	fight	/	553.42
201	Bonk	H6KJTT0CP	542.51
202	Synapse	GS8ZHZ81L	542.40
203	World Mobile Token	/	517.94
204	Gala	XS363HTZB	511.12
205	Bancor	HXXRZB3CB	498.24
206	picasso	/	497.04
207	Wayfinder Prompt	3DFF12GSV	497.02
208	Aethir Token	1SL20Z9P1	495.73
209	Maple Finance	/	475.66
210	Non Playable Coin	/	474.81
211	Reserve Rights	/	471.25
212	Compound	KCHF60NW7	466.54
213	Kamino Finance	LLRPNCLLK	459.59
214	Wrapped Axelar	/	454.66
215	brevis	/	454.10
216	SAND	BVGX9WS2C	450.60
217	Virtual Protocol	7WMBV0R29	445.29
218	SushiSwap	C1Z2W2TT1	445.00
219	galxe	/	443.75
220	Gravity	JQGMWFSXV	442.74
221	Euler	BJSLLNX42	441.18
222	JUST	DFGV0P5MN	440.18
223	VeThor	C06P3SQNX	439.40
224	yooldo	/	433.94
225	Synthetix Network	RSN26S0SB	433.48

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
226	origintrail	/	432.96
227	Raydium	7HFXRDFHH	419.19
228	JasmyCoin	CTLCNFBZW	387.06
229	Arkham	327V1DQ8H	384.58
230	Numeraire	TCRZ9GZRF	379.47
231	Decentraland	21C6LF4SP	378.92
232	FLOKI	R1XC4HQT5	378.39
233	Space And Time	/	377.49
234	Immutable X	9LJ0XLJBT	377.42
235	SUN	DRSV113K4	377.02
236	Basic Attention Token	51F8M277P	376.86
237	Vision ETH	/	373.52
238	StargateToken	RGP779MCT	372.73
239	JoeToken	VV204Q4J4	370.24
240	Humanity Protocol	/	366.11
241	Sahara AI	4PS1S77QG	365.01
242	Ethereum Name Service	B70SMJ5DQ	363.37
243	Radicle	315760HRD	355.00
244	Optimism	9NRMM2RC4	349.85
245	OFFICIAL TRUMP	LJDPGNXXK	346.19
246	Dolomite	G6QFN3Z7F	339.40
247	Coq Inu	6KJB18HSF	335.26
248	Newton Protocol	/	331.47
249	Treehouse	7PQ1242P3	330.35
250	Maker	SV17PZF24	321.54
251	RedStone	7M4589PKM	315.64
252	yearn finance	LS56Z3QRX	315.29
253	Perpetual	VTP4QVSMM	312.66
254	StarkNet Token	NLWPNNWQZ	310.25
255	Plume	FRZQZJ7BL	305.57
256	Bounce Token	CX8MCQ9R0	304.04
257	Ankr	BL90MVXW4	303.42
258	SuperVerse	N886T4TWH	296.20
259	BIO	TBR0XDRN8	280.21
260	kgen	/	276.14

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
261	Yield Guild Games Token	WV93P8B45	272.92
262	Animecoin	7WD8SJ6W6	271.93
263	Turbo	3GCHWJSWC	260.38
264	ren	/	259.07
265	XY Oracle	B1LR50328	254.35
266	harrypotterobamasonic	/	253.60
267	0x Protocol Token	HX56HH1ZX	251.48
268	Rocket Pool	69Q6NLJ3M	243.36
269	zigchain	/	242.30
270	Liquity	C5D1WG11D	241.16
271	Livepeer	J80JRP8VM	238.11
272	Useless Coin	/	233.74
273	Zora	M4DCVM90D	233.13
274	BitTorrent New	2MTMX7RJR	232.79
275	Moca	NRS9TCXX2	228.89
276	rekt	/	225.10
277	infinit	/	222.54
278	tanssi	/	215.91
279	Step Finance	/	212.47
280	usual	/	210.24
281	Spell Token	2D7W0LVCF	208.89
282	Global Dollar	R9MZCNWS4	207.68
283	AltLayer Token	B7HS0LP5T	207.61
284	tokenfi	/	206.90
285	ssv network	CLN52KS0K	206.41
286	Safe Token	GLNXBZWH5	201.65
287	Audius	QZMN0FP41	199.79
288	double_zero	/	198.81
289	Limewire	/	198.80
290	Apu Apustajasee	/	192.79
291	Layer3	GCG7S59XF	186.76
292	zero_base	/	179.85
293	Helium	4GX02L80B	178.67
294	LCX	LDWJPG944	177.18
295	PowerLedger	JWDR0ZDL6	175.91

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
296	COTI Token	4LMM6WFBW	174.93
297	Pudgy Penguins	13JBPT88T	172.83
298	Nosana	FXD9KSSZF	172.51
299	ARPA Token	XM59GZ001	172.16
300	corn	/	172.15
301	Quantoz USDQ	XL2ZV90NC	171.86
302	Echelon Prime	1VJ02JBZN	171.47
303	spacecoin	/	170.73
304	WINkLink	DMFRX829S	170.28
305	Orderly Network	/	167.89
306	midnight	/	167.62
307	Centrifuge	J8HB3QFM5	167.18
308	KERNEL	L6N3VM7CM	165.20
309	Aerodrome	N26VFQW6M	164.81
310	gomining	/	164.51
311	ecomi	/	163.87
312	UMA Voting Token v1	JM4LKD71T	163.28
313	bondex	/	158.39
314	Mask Network	VTV046TSP	156.72
315	Bluzelle Token	2NFJBNQWN	155.62
316	Zebec Network	DHV5NRJCF	154.03
317	Aevo	GXXVVRJW1	153.07
318	Wootrade Network	G4515JG80	152.26
319	balance	/	152.03
320	API3	9PJW29SF7	148.46
321	Alchemy	MBKSZCVQM	148.37
322	swell	/	146.54
323	htx	/	143.31
324	Enjin	M9LNQXMNV	142.43
325	Blur	R91SVKW99	142.21
326	Civic	95LV3DCWZ	140.61
327	Ocean Token	TDDNSZP8W	140.30
328	Alchemix	WJCRD5LVT	139.59
329	Succinct	1ZZ7H452N	137.82
330	Threshold Network Token	LTSB7W5CZ	137.39

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
331	Pstake Finance	/	137.36
332	APENFT	4MH0C4BL6	135.17
333	StorjToken	3W1DV4L6C	129.80
334	BENQI	HZZKQKLNK	126.85
335	OriginToken	4N5X371R3	125.62
336	ket	/	124.30
337	Big Time	DM8NPMHHW	123.70
338	AIOZ Network	BRPL13L58	123.13
339	Hyperlane	8VJ8TXW4B	121.83
340	LoopringCoin V2	NZCPF6J82	121.43
341	cat in a dogs world	5Z3NS3NDB	119.75
342	quack_ai	/	114.01
343	Verse World	/	111.13
344	HoloToken	PZHXZVGJB	110.91
345	Gluwa Creditcoin Vesting Token	CJSC8G9C3	110.15
346	Wormhole Token	25J14XV4F	109.73
347	chintai	/	108.89
348	Renzo	/	108.74
349	Zircuit	PRF8RNVR4	105.97
350	Covalent X Token	PPFFC2XZM	102.49
351	Request Token	3CJF47H8S	102.35
352	dogwifhat	10G31SK86	102.16
353	Cartesi Token	BL44WHVKM	101.78
354	bluwhale	/	97.76
355	rhea_finance	/	97.55
356	Kyber Network Crystal v2	L0DZSBLVZ	97.15
357	Vanar	/	96.63
358	Hashflow	N3K1P14QN	95.47
359	Wen	CT2TZWNCQ	94.40
360	eclipse	/	94.15
361	bitlayer	/	93.98
362	Phala	C03MS3PW1	93.34
363	SuperRare	BP7F347WD	92.07
364	Orca	QS946B4NN	91.97
365	Mind Network	/	90.85

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
366	Gnosis Token	VXDLZ59FC	90.51
367	GMX	RBR43JPK5	88.51
368	Biconomy Token	Z2JL201QX	86.25
369	anoma	/	86.10
370	Rarible	2GFN66H47	82.63
371	Harvest Finance	/	81.66
372	codatta	/	75.83
373	saros	/	75.76
374	POPCAT	CPLCKVT11	74.80
375	propy	/	74.25
376	obol	/	73.70
377	Aavegotchi GHST Token	JCMPCVD08	71.59
378	Adventure Gold	2QNVF4SDM	71.57
379	PolkastarterToken	8V4HL8BTV	71.07
380	Pyth Network	3980Q2CPS	69.23
381	Gitcoin	7JZQ9SP76	68.59
382	Enzyme	/	68.57
383	overtake	/	67.12
384	Ambire AdEx	/	66.26
385	theoriq	/	65.89
386	BandToken	1QM2QZQ5N	65.76
387	GameBuild	8RL4W6N7Q	64.68
388	deBridge	NT91TJWNC	64.01
389	vultisig	/	63.27
390	puffer	/	62.99
391	Goldfinch	CKL6S2F6B	62.99
392	ROOK	NJP8NH5JB	62.28
393	GAIB	/	62.15
394	Orchid	WHX0WG0LT	61.35
395	pipe_network	/	60.61
396	aixbt by Virtuals	8762TQWQ6	60.22
397	iEx ec Network Token	XFRDT01VR	60.01
398	Marlin POND	QFL8HTJ6P	59.60
399	talus	/	59.21
400	AI Rig Complex	K499MSW6G	56.01

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
401	lava_network	/	54.82
402	Open Campus	RZ2VMHM33	54.01
403	xl_one	/	52.35
404	Jito	D3XB6KZ00	51.73
405	Keep3rV1	KDFPP8K07	51.28
406	CelerToken	3W8JZTFR6	51.02
407	playsout	/	50.97
408	almanak	/	50.92
409	dYdX	K8XRF7MFZ	50.67
410	derive	/	50.41
411	Badger	4GZZFJMVV	50.36
412	ResearchCoin	FDQM0JPZP	48.31
413	cudis	/	47.79
414	My Shell	/	46.95
415	PORTAL	FM8WBW4WC	46.53
416	sport_fun	/	45.80
417	Across Protocol Token	1J4GM86GD	45.68
418	infinity_ground	/	44.80
419	gaia	/	44.40
420	camp	/	43.91
421	TrueFi	XRDMKF3GK	43.48
422	Dent	/	42.56
423	Bricks	ZK1ZVS368	42.05
424	anon	/	41.70
425	myx_finance	/	41.19
426	SUNDOG	/	40.41
427	Venice Token	P0SD47M0W	40.22
428	Flux	4DF5G5HFZ	40.10
429	Neiro	Q4TK4Q00M	40.08
430	BarnBridge	XVVR6FX58	39.72
431	Ampleforth Governance	62SV6Q4QP	39.44
432	astra_nova	/	39.40
433	Liquid Staked ETHereum	/	39.10
434	AVA	L5W9562HZ	38.72
435	GIGACHAD	W1GC0WX1K	37.54

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
436	Tokemak	6B8SMHSXT	37.31
437	Coin98	HP7M2N1QF	37.16
438	NYM	/	36.74
439	Clover	THR3ML1F1	34.47
440	Huma Finance	PPPSTQ5M9	34.32
441	Augur Reputation Token	B6CQ0H4PC	33.98
442	Chromia	/	33.34
443	Serum	RQQ7X7PQF	33.07
444	Zeus Network	/	33.05
445	rayls	/	31.62
446	openloot	/	31.27
447	Alchemist AI	/	30.23
448	Magic Eden	7987R7S6H	29.80
449	Samoyedcoin	/	29.69
450	Sonic SVM	WLR4VX2XB	29.61
451	Vine Coin	B4FW49N5P	28.14
452	Drift	6RVP9P5TB	26.67
453	Open Loot	/	26.10
454	Banana For Scale	/	25.78
455	StaFi	3HNH358VV	25.75
456	bertram_the	/	25.68
457	Gmt	/	24.59
458	Soso Value	/	24.27
459	FWOG	ZLJGJG83S	24.17
460	Sweat Economy	DFK01RSF7	24.12
461	Star Atlas Dao	/	24.05
462	StablR Euro	R3QQ9C02D	23.62
463	OMGToken	HRSP99WHX	23.62
464	roll	/	23.44
465	ai16z	8SQN5VKWH	23.42
466	Grass	MNCR2MKHP	22.68
467	Cloud	TP1T71J95	22.58
468	suku	/	22.17
469	swarms	30KCVXPWP	21.08
470	hivemapper	/	20.96

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
471	IDEX Token	1PC14K39T	20.92
472	AlphaToken	JGRKW0RKC	20.42
473	Alien Worlds Trilium	SGCHCLHT4	20.22
474	SOON	/	19.95
475	tribe	/	19.86
476	tokenbot	B9BF88ZXP	19.84
477	Melania Meme	TC417FPLR	19.71
478	Marinade	KP2V762CJ	19.66
479	elixir	/	19.08
480	Keep Network	/	18.73
481	zerebro	/	18.61
482	BitDAO	12NWNXVVR	17.95
483	bless	/	17.91
484	Parcl	JPJ2QRH6R	16.96
485	Moo Deng	H3X85BK7M	16.50
486	Multichain	KB7FDVF57	16.44
487	Robonomics	/	16.17
488	Mirror Protocol	/	15.79
489	giza	/	15.68
490	xMoney	/	15.68
491	Act I The AI Prophecy	H4JMWRVR6	15.58
492	Aventus	WDSRWS0CT	14.68
493	mira	/	14.06
494	bifrost	/	13.83
495	rubic	/	13.70
496	Unifi Protocol	/	13.68
497	boost	/	13.41
498	aura	/	13.33
499	Unstable Coin	/	13.18
500	Dai Token	R5GCQW24K	13.07
501	retardio	/	13.04
502	zeta	/	12.74
503	Nobody Sausage	Q2BLLJNF8	12.46
504	test griffain com	QXN32WLR2	12.44
505	Omni Network	/	12.34

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
506	Litentry	1NBBMSK3X	12.13
507	Solayer	PWG559QJQ	11.73
508	PONKE	DJLRN98WQ	11.55
509	Jupiter	LKWXN892M	11.14
510	Stablr Usd	/	11.07
511	eurq	/	10.99
512	Swipe	J82048MMV	10.88
513	Moonchain	/	10.84
514	Eva AI	/	10.78
515	SelfKey	5GHXJSGXK	10.57
516	planck	/	10.49
517	Kin	/	10.31
518	spice	/	9.79
519	oxygen	/	9.17
520	Peanut the Squirrel	75D0KJ7WN	8.87
521	Term Finance	/	8.72
522	yala_yu	/	8.60
523	michi	/	8.51
524	Avantis	DGJJGJJPB	8.45
525	Goatseus Maximus	7FS1WX5VK	8.41
526	Cheems Token	/	7.98
527	Chill House	/	7.96
528	moonwalk_fitness	/	7.62
529	carv	/	7.42
530	Tensor	NTJJ182D7	7.41
531	DOGS	JTT6RNXDG	6.45
532	notcoin	/	6.45
533	Hamster Kombat	S770D4DST	6.45
534	Gari	3F283FQ8S	6.23
535	Unicorn Fart Dust	/	6.04
536	NodeOps	KWK003WN7	5.84
537	housecoin	/	5.62
538	Bonfida	K7TKSGGHC	5.53
539	Bubblemaps	FJ8LK1Z36	5.49
540	maple	/	5.46

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
541	Gensokishi Metaver	/	5.25
542	Lock In	/	4.98
543	Toshi	WT9GJ1K9R	4.93
544	keeta	/	4.85
545	375ai	/	4.42
546	PlayDapp	4XC8CV8ZN	4.26
547	titcoin	/	4.15
548	Fidelity Digital	/	4.11
549	Degen	253CXJJ4H	4.10
550	sigma	/	4.08
551	Alkimi	54CWD3QSG	3.55
552	mango	/	3.50
553	solv	/	3.25
554	Cookie DAO	DBRTW3FF8	3.24
555	saber	/	3.22
556	virtua	/	3.19
557	satlayer	/	3.05
558	flock_io	/	3.02
559	europ	/	2.62
560	Merit Circle	KWRXWPTP2	2.41
561	Soma Finance	/	2.13
562	checkmate	/	2.06
563	definitive	/	1.95
564	ghiblification	/	1.86
565	Impossible Cloud Network	/	1.85
566	Mubarak	WWW3TNHWT	1.81
567	freestyle_classic	/	1.78
568	Jeo Boden	/	1.76
569	intuition	/	1.68
570	moonveil	/	1.65
571	KAITO	Z3JGDP628	1.41
572	cfb_benchmarks	/	1.35
573	B3	BPLSKNPD9	1.15
574	Abc Labs	/	1.11
575	xterio	/	1.09

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
576	test	/	1.02
577	Sapien	NFF56QPXF	1.01
578	freysa	/	0.90
579	Stool Prisondente	/	0.85
580	estatex	/	0.84
581	auki	/	0.69
582	forest	/	0.65
583	Particle Network	/	0.60
584	Sogni AI	/	0.53
585	GreenSatoshiToken	PBSSTVTM0	0.40
586	odos	/	0.35
587	rize	/	0.30
588	Crust Shadow	/	0.14
589	oobit	/	0.14
590	unite	/	0.09
591	Ls Solana	/	0.00
592	Raiin	5TNGTBJ2D	0.00
593	Backstage	4ZQGRG6CC	0.00
594	linkka	/	0.00
595	Black Mirror Experience Token	9D7L206V0	0.00
596	revive	/	0.00
597	moons	/	0.00
598	genshiro	/	0.00
599	traceability	/	0.00
600	envision	/	0.00
601	My Neighbor Alice	1S7VZCTZL	0.00
602	hybrid	/	0.00

Sustainability indicators

Bitcoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bitcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	146363234697.79501	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	9.32899	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	60301076.21914	tCO2e
S.14 GHG intensity	3.84351	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Bitcoin is present on the following networks: Bitcoin, Lightning Network.

The Bitcoin blockchain network uses a consensus mechanism called Proof of Work (PoW) to achieve distributed consensus among its nodes. Here's a detailed breakdown of how it works:

Core Concepts:

1. Nodes and Miners:
   - Nodes: Nodes are computers running the Bitcoin software that participate in the network by validating transactions and blocks.
   - Miners: Special nodes, called miners, perform the work of creating new blocks by solving complex cryptographic puzzles.
2. Blockchain: The blockchain is a public ledger that records all Bitcoin transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).
3. Hash Functions: Bitcoin uses the SHA-256 cryptographic hash function to secure the data in blocks. A hash function takes input data and produces a fixed-size string of characters, which appears random.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction must be validated by nodes to ensure it follows the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
   - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the SHA-256 hash function, produces a hash that is less than a target value. This target value is adjusted periodically to ensure that blocks are mined approximately every 10 minutes.

- Proof of Work: The process of finding this nonce is computationally intensive and requires significant energy and resources. Once a miner finds a valid nonce, they broadcast the newly mined block to the network.

3. Block Validation and Addition: Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid. If the block is valid, nodes add it to their copy of the blockchain and the process starts again with the next block.
4. Chain Consensus: The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain. In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group ("FFG") relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the "per transaction" count would be substantially higher.

S.5 Incentive Mechanisms and Applicable Fees

Bitcoin is present on the following networks: Bitcoin, Lightning Network.

The Bitcoin blockchain relies on a Proof-of-Work (PoW) consensus mechanism to ensure the security and integrity of transactions. This mechanism involves economic incentives for miners and a fee structure that supports network sustainability:

Incentive Mechanisms:

1. Block Rewards:
   - Newly Minted Bitcoins: Miners are incentivized by block rewards, which consist of newly created bitcoins awarded to the miner who successfully mines a new block. Initially, the block reward was 50 BTC, but it halves every 210,000 blocks (approx. every four years) in an event known as the "halving."
   - Halving and Scarcity: The halving mechanism ensures that the total supply of Bitcoin is capped at 21 million, creating scarcity and potentially increasing value over time.
2. Transaction Fees:
   - User Fees: Each transaction includes a fee paid by the user to incentivize miners to include their transaction in a block. These fees are crucial, especially as the block reward diminishes over time due to halving.
   - Fee Market: Transaction fees are determined by the market, where users compete to have their transactions processed quickly. Higher fees typically result in faster inclusion in a block, especially during periods of high network congestion.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group ("FFG") relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the "per transaction" count would be substantially higher

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: SHA-256. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) lightning_network is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-

information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Dogecoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Dogecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	5538165186.77219	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.17342	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	2281702.24395	tCO2e
S.14 GHG intensity	0.07145	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Dogecoin (DOGE) uses a Proof of Work (PoW) consensus mechanism, similar to Bitcoin, but with some key differences.

Core Concepts :

1. Nodes and Miners:
   - Nodes: Nodes in the Dogecoin network are computers running the Dogecoin software. They validate transactions, maintain the blockchain, and relay information across the network.
   - Miners: Miners are specialized nodes that solve cryptographic puzzles to create new blocks and validate transactions. This process is known as mining.
2. Blockchain: The blockchain is a public ledger that records all Dogecoin transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).
3. Hash Functions: Dogecoin uses the Scrypt hash function, which is different from Bitcoin's SHA-256. Scrypt is designed to be more memory-intensive, making it more resistant to ASIC

(Application-Specific Integrated Circuit) mining and encouraging more widespread participation by regular users with less powerful hardware.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction is validated by nodes to ensure it adheres to the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
   - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the Scrypt hash function, produces a hash below a certain target value. This target value is adjusted periodically to maintain a consistent block creation time.
   - Proof of Work: Finding a valid nonce requires significant computational effort. Once a miner finds a valid nonce, the new block is broadcast to the network.
3. Block Validation and Addition: Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid. If the block is valid, nodes add it to their copy of the blockchain, and the process repeats for the next block.
4. Chain Consensus: The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain. In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

Security and Economic Incentives:

1. Incentives for Miners:
   - Block Rewards: Miners are incentivized to participate in the network by receiving block rewards. Initially, Dogecoin had a variable block reward, but now it offers a fixed reward of 10,000 DOGE per block.
   - Transaction Fees: Miners also collect transaction fees from the transactions included in the block. These fees provide an additional incentive for miners.
2. Security:
   - Hash Rate and Difficulty: The security of the Dogecoin network is directly proportional to its hash rate, the total computational power of all miners. A higher hash rate means more difficult and costly attacks.
   - 51% Attack: An attacker would need to control more than 50% of the network's hash rate to double-spend or rewrite parts of the blockchain. The cost and resource requirement for such an attack make it impractical for a sufficiently large and decentralized network like Dogecoin.
3. Merged Mining: Dogecoin supports merged mining with Litecoin (LTC). This means miners can mine both Dogecoin and Litecoin simultaneously without additional computational effort. This enhances the security of both networks by pooling their hash rates.

S.5 Incentive Mechanisms and Applicable Fees

Dogecoin uses a Proof of Work (PoW) consensus mechanism to ensure network security and integrity, relying on economic incentives for miners and transaction fees from users.

Incentive Mechanisms

1. Miners:
   - Block Rewards: Miners receive block rewards for successfully mining new blocks. Initially, Dogecoin had a variable block reward, but it now offers a fixed reward of 10,000 DOGE per block. These rewards are a primary incentive for miners to invest in the computational power necessary to secure the network.

- Transaction Fees: In addition to block rewards, miners also earn transaction fees from the transactions they include in the blocks they mine. Although Dogecoin's transaction fees are typically low, they still provide an important supplementary income for miners.
- Merged Mining: Dogecoin supports merged mining with Litecoin, allowing miners to simultaneously mine both cryptocurrencies without additional computational effort. This process increases the hash rate and security of both networks by pooling their resources.

2. Security:
- Hash Rate and Difficulty: The security of Dogecoin's network is directly related to its hash rate, the total computational power used by all miners. A higher hash rate makes the network more resistant to attacks. The mining difficulty adjusts periodically to ensure that blocks are mined approximately every minute, maintaining network stability. 51% Attack Deterrence: Controlling more than 50% of the network's hash rate to perform a 51% attack is costly and difficult. The significant computational power and energy required make such attacks impractical for a large and decentralized network like Dogecoin.

Fees Applicable on the Dogecoin Blockchain:

1. Transaction Fees:
- Flat Fee Structure: Dogecoin uses a relatively simple fee structure. The typical transaction fee is 1 DOGE per kilobyte of transaction data. This low fee is one of Dogecoin's appeals, making it suitable for small and micro-transactions.
- Incentives for Faster Processing: Although transaction fees are generally low, users can choose to pay higher fees to incentivize miners to include their transactions in the next block, ensuring faster processing times.

2. Mining Rewards:
- Block Subsidy: The fixed block reward of 10,000 DOGE incentivizes miners to continue securing the network. This reward will persist as Dogecoin does not have a maximum supply cap, ensuring continuous incentives for miners.
- Fee Inclusion: Besides the block subsidy, the inclusion of transaction fees provides an additional, albeit smaller, incentive for miners to process transactions efficiently.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Scrypt. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

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Kaspa

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Kaspa	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	2831162818.95504	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.77566	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	1166427.93040	tCO2e

Field	Value	Unit
S.14 GHG intensity	0.31957	kgCO2e

Qualitative information

S.4 Consensus Mechanism

The Kaspa blockchain uses a unique Proof-of-Work consensus mechanism called the GHOSTDAG (Greedy Heaviest Observed Subtree Directed Acyclic Graph) protocol. GHOSTDAG is designed to offer high throughput, low latency, and secure finality, addressing scalability and performance challenges typically faced by traditional blockchain systems.

Key Features of Kaspa's Consensus Mechanism:

1. Directed Acyclic Graph (DAG) Structure: Kaspa operates on a DAG, allowing multiple blocks to be produced simultaneously and linked together in a way that eliminates the need for a single linear chain. This allows for parallel block production, significantly increasing the overall throughput of the network. Unlike traditional blockchains where only the longest chain is considered valid, Kaspa allows blocks to coexist, increasing transaction throughput and scalability.
2. GHOSTDAG Protocol: The GHOSTDAG protocol resolves the challenges that arise in DAG-based networks by ensuring a consistent ordering of blocks. It uses the concept of \growing" blocks from the heaviest observed subtree.

S.5 Incentive Mechanisms and Applicable Fees

Kaspa employs a Proof-of-Work (PoW) consensus mechanism to secure its network and incentivize participants. Miners validate transactions and add new blocks to the DAG (Directed Acyclic Graph) structure, earning rewards for their efforts.

Incentive Mechanism:

1. Mining Rewards:
   - Block Rewards: Miners receive newly minted KAS tokens as rewards for successfully mining new blocks. The block reward decreases over time, following a predetermined schedule, to control the total supply of KAS tokens.
   - Transaction Fees: In addition to block rewards, miners earn transaction fees from the transactions included in the blocks they mine. Users pay these fees to incentivize miners to prioritize their transactions.
2. Transaction Fees:
   Users pay transaction fees to have their transactions processed and included in the blockchain. These fees are determined by the size of the transaction and the current network conditions. Higher fees can expedite transaction inclusion, especially during periods of high network activity.

Applicable Fees:

1. Transaction Fees:
   Transaction fees are calculated based on the size of the transaction, measured in bytes. The fee rate is dynamic and adjusts according to network congestion and demand. Users can estimate appropriate fee rates using tools like the Rusty Kaspa node's getFeeEstimate() RPC method, which provides real-time fee rate suggestions based on current network conditions.

2. Fee Rate and Quality of Service (QoS):
   The fee rate influences the priority of transactions. A higher fee rate increases the likelihood of a transaction being included in the next block, ensuring faster confirmation times. Kaspa's fee structure allows users to adjust their fee rates to balance cost and transaction speed according to their preferences.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: KHeavyhash. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

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S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity generation - Ember and Energy Institute”

[dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Bitcoin Cash

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bitcoin Cash	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1219352470.26588	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.16898	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	502368.41512	tCO2e
S.14 GHG intensity	0.06962	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Bitcoin Cash is present on the following networks: Bitcoin Cash, Smart Bitcoin Cash.

The Bitcoin Cash blockchain network uses a consensus mechanism called Proof of Work (PoW) to achieve distributed consensus among its nodes. It originated from the Bitcoin blockchain, hence has the same consensus mechanisms but with a larger block size, which makes it more centralized.

Core Concepts:

1. Nodes and Miners:
   - Nodes: Nodes are computers running the Bitcoin Cash software that participate in the network by validating transactions and blocks.
   - Miners: Special nodes, called miners, perform the work of creating new blocks by solving complex cryptographic puzzles.
2. Blockchain: The blockchain is a public ledger that records all Bitcoin Cash transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).
3. Hash Functions: Bitcoin Cash uses the SHA-256 cryptographic hash function to secure the data in blocks. A hash function takes input data and produces a fixed-size string of characters, which appears random.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction must be validated by nodes to ensure it follows the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
   - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the SHA-256 hash function, produces a hash that is less than a target value. This target value is adjusted periodically to ensure that blocks are mined approximately every 10 minutes.
   - Proof of Work: The process of finding this nonce is computationally intensive and requires significant energy and resources. Once a miner finds a valid nonce, they broadcast the newly mined block to the network.
3. Block Validation and Addition:
   - Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid.
   - If the block is valid, nodes add it to their copy of the blockchain and the process starts again with the next block.
4. Chain Consensus:
   - The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain.
   - In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

Smart Bitcoin Cash (SmartBCH) operates as a sidechain to Bitcoin Cash (BCH), leveraging a hybrid consensus mechanism combining Proof of Work (PoW) compatibility and validator-based validation.

Core Components:
- Proof of Work Compatibility: SmartBCH relies on Bitcoin Cash's PoW for settlement and security, ensuring robust integration with BCH’s main chain. SHA-256 Algorithm: Uses the same SHA-256 hashing algorithm as Bitcoin Cash, allowing compatibility with existing mining hardware and infrastructure.
- Consensus via Validators: Transactions within SmartBCH are validated by a set of validators chosen based on staking and operational efficiency. This hybrid approach combines the hash power of PoW with a validator-based model to enhance scalability and flexibility.

S.5 Incentive Mechanisms and Applicable Fees

Bitcoin Cash is present on the following networks: Bitcoin Cash, Smart Bitcoin Cash.

The Bitcoin Cash blockchain operates on a Proof-of-Work (PoW) consensus mechanism, with incentives and fee structures designed to support miners and the overall network's sustainability:

Incentive Mechanism:

1. Block Rewards:
   - Newly Minted Bitcoins: Miners receive a block reward, which consists of newly created bitcoins for successfully mining a new block. Initially, the reward was 50 BCH, but it halves approximately every four years in an event known as the "halving."
   - Halving and Scarcity: The halving ensures that the total supply of Bitcoin Cash is capped at 21 million BCH, creating scarcity that could drive up value over time.

2. Transaction Fees:
   - User Fees: Each transaction includes a fee, paid by users, that incentivizes miners to include the transaction in a new block. This fee market becomes increasingly important as block rewards decrease over time due to the halving events.
   - Fee Market: Transaction fees are market-driven, with users competing to get their transactions included quickly. Higher fees lead to faster transaction processing, especially during periods of high network congestion.

Applicable Fees:

1. Transaction Fees:
   Bitcoin Cash transactions require a small fee, paid in BCH, which is determined by the transaction's size and the network demand at the time. These fees are crucial for the continued operation of the network, particularly as block rewards decrease over time due to halvings.
2. Fee Structure During High Demand:
   In times of high congestion, users may choose to increase their transaction fees to prioritize their transactions for faster processing. The fee structure ensures that miners are incentivized to prioritize higher-fee transactions.

SmartBCH's incentive model encourages validators and network participants to secure the sidechain and process transactions efficiently.

Incentive Mechanisms:

- Validator Rewards: Validators are rewarded with a share of transaction fees for their role in validating transactions and maintaining the network.
- Economic Alignment: The system incentivizes validators to act in the network's best interest, ensuring stability and fostering adoption through economic alignment.

Applicable Fees:

Transaction Fees: Fees for transactions on SmartBCH are paid in BCH, ensuring seamless integration with the Bitcoin Cash ecosystem.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: SHA-256. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are

assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

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S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

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Litecoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Litecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	794702264.04206	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.02664	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	327414.20272	tCO2e
S.14 GHG intensity	0.01098	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Litecoin, like Bitcoin, uses Proof of Work (PoW) as its consensus mechanism, but with a few key differences:

1. Scrypt Hashing Algorithm: Unlike Bitcoin's SHA-256 algorithm, Litecoin uses the Scrypt hashing algorithm, which is more memory-intensive. This makes mining Litecoin more accessible to regular users and limits the advantages of specialized hardware (like ASICs) in the early years.
2. Mining and Block Creation: Miners compete to solve cryptographic puzzles and, upon success, add new blocks to the blockchain. This process involves solving the Scrypt algorithm, which requires computational work. The first miner to solve the problem earns the block reward and transaction fees associated with the transactions in the block.
3. Block Time: Litecoin has a block time of 2.5 minutes, much faster than Bitcoin's 10 minutes. This means transactions confirm more quickly, increasing the overall network speed.
4. Block Reward Halving: Similar to Bitcoin, Litecoin has a block reward halving event approximately every four years. Initially, miners earned 50 LTC per block, but this reward decreases by half after each halving event. This process continues until the maximum supply of 84 million LTC is reached.
5. Difficulty Adjustment: Litecoin adjusts the mining difficulty approximately every 2,016 blocks (about every 3.5 days) to ensure that blocks continue to be mined at a consistent rate of 2.5 minutes per block, regardless of fluctuations in the total network hash rate.

S.5 Incentive Mechanisms and Applicable Fees

Litecoin, like Bitcoin, uses the Proof of Work (PoW) consensus mechanism to secure transactions and incentivize miners.

Incentive Mechanisms:

1. Mining Rewards:
   Block Rewards: Miners are rewarded with Litecoin (LTC) for successfully mining new blocks. Initially, miners received 50 LTC per block, but this reward halves approximately every four years. Transaction Fees: Miners also earn transaction fees from the transactions included in the blocks they mine. Users pay fees to have their transactions processed by miners, especially when they need faster confirmation times.
2. Halving:
   The halving mechanism ensures that over time, fewer Litecoins are introduced into circulation, creating a deflationary model. This makes mining more valuable as the circulating supply becomes scarcer, incentivizing miners to continue participating in the network even as block rewards decrease.
3. Economic Security:
   The cost of mining (e.g., hardware and electricity) provides a strong economic incentive for miners to act honestly. If miners attempt to cheat or attack the network, they risk losing the computational work they invested, as invalid blocks will be rejected by the network.

Fees on the Litecoin Blockchain:

- Transaction Fees: Litecoin users pay a transaction fee for each transaction, typically calculated in LTC per byte of transaction data. The fees are dynamic and vary based on network congestion.
- Low Fees: Litecoin is known for its relatively low transaction fees compared to other blockchains like Bitcoin, which makes it ideal for smaller transactions and micro-payments.
- Fee Redistribution: Collected transaction fees are distributed to miners as part of their rewards for validating transactions and securing the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Scrypt. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are

used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Ethereum Classic Ether

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ethereum Classic Ether	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	534728489.75562	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.10240	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	220306.03166	tCO2e
S.14 GHG intensity	0.04219	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Ethereum Classic operates on a Proof of Work (PoW) consensus mechanism with the Etchash algorithm, which is a modified version of Ethash. This PoW model requires computational work from miners to validate transactions and secure the network.

Core Components:

- Proof of Work with Etchash Mining and Security: Miners use computational resources to perform the work necessary to add blocks to the blockchain, ensuring network security and resistance to tampering.
- Code is Law Philosophy Immutable Ledger: Following the 2016 DAO hack, Ethereum Classic upheld the "Code is Law" principle by retaining the unaltered blockchain. This commitment to immutability sets Ethereum Classic apart, preserving its original ledger without reverting transactions.

S.5 Incentive Mechanisms and Applicable Fees

Ethereum Classic's incentive model combines block rewards and transaction fees, encouraging miner participation and network security.

Incentive Mechanisms:

1. Block Rewards:
   Deflationary Supply Model: Miners receive ETC through block rewards, which decrease over time, similar to Bitcoin's model. This deflationary design supports ETC's value retention and incentivizes continued mining efforts.
2. Transaction Fees:
   User-Paid Fees: Users pay fees in ETC for sending transactions, interacting with smart contracts, and utilizing dApps. These fees provide miners with additional income and help maintain network security.

Applicable Fees: Ethereum Classic's fee structure involves user-paid transaction fees to support network operations and discourage spam transactions.

1. Transaction Fees:
   - User-Paid Fees: Every transaction on Ethereum Classic incurs a fee in ETC, based on the computational effort required. These fees ensure that resources are efficiently used and contribute to miner revenue.
   - Dynamic Demand-Based Fees: Fees vary according to transaction complexity and network demand, helping maintain transaction efficiency and preventing congestion.
2. Mining Rewards:
   Block Rewards Reduction: Block rewards, which are scheduled to reduce over time, provide a primary income source for miners. This model aims to balance network security while managing ETC's supply.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central

factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Etchash. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity generation - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Zcash

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Zcash	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	322297410.11035	kWh/a
S.10 Renewable energy consumption	34.4781475757	%
S.11 Energy intensity	1.98714	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	132785.26273	tCO2e
S.14 GHG intensity	0.81870	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Zcash is present on the following networks: Binance Smart Chain, Zcash.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Zcash operates on a Proof of Work (PoW) consensus mechanism, using the Equihash algorithm, which requires miners to dedicate computational power to validate transactions and produce new blocks.

Core Components:

1. Equihash PoW: Mining Process:
   Miners compete to add new blocks by investing computational resources. This work serves as proof that miners are actively contributing to network security.
2. zk-SNARKs Integration:
   Zcash utilizes zk-SNARKs (Zero-Knowledge Succinct Non-Interactive Arguments of Knowledge) to enable privacy-focused transactions. This cryptographic proof mechanism allows transactions to be verified without revealing sensitive information, such as the sender, recipient, or amount.

S.5 Incentive Mechanisms and Applicable Fees

Zcash is present on the following networks: Binance Smart Chain, Zcash.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Zcash incentivizes miners through block rewards and transaction fees, supporting both network security and operational efficiency.

Incentive Mechanisms:

1. Block Rewards: Miners receive ZEC as a reward for creating blocks, encouraging ongoing network support and computational investment.
2. Transaction Fees: Users pay transaction fees in ZEC for processing transactions, which miners receive in addition to block rewards.

Applicable Fees:

Enhanced Privacy and Shielded Transactions:
   zk-SNARKs Efficiency: While shielded transactions offer privacy, they require more computational resources, which may slightly increase fees. Upgrades like Halo aim to enhance the efficiency of zk-SNARKs, keeping shielded transaction costs manageable.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Equihash. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-

information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity generation - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

DOG•GO•TO•THE•MOON

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	DOG•GO•TO•THE•MOON	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	155242360.41471	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	9.32899	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	63959.24104	tCO2e
S.14 GHG intensity	3.84351	kgCO2e

Qualitative information

S.4 Consensus Mechanism

The Bitcoin blockchain network uses a consensus mechanism called Proof of Work (PoW) to achieve distributed consensus among its nodes. Here's a detailed breakdown of how it works:

Core Concepts:

1. Nodes and Miners:
   - Nodes: Nodes are computers running the Bitcoin software that participate in the network by validating transactions and blocks.
   - Miners: Special nodes, called miners, perform the work of creating new blocks by solving complex cryptographic puzzles.
2. Blockchain: The blockchain is a public ledger that records all Bitcoin transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).

3. Hash Functions: Bitcoin uses the SHA-256 cryptographic hash function to secure the data in blocks. A hash function takes input data and produces a fixed-size string of characters, which appears random.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction must be validated by nodes to ensure it follows the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
   - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the SHA-256 hash function, produces a hash that is less than a target value. This target value is adjusted periodically to ensure that blocks are mined approximately every 10 minutes.
   - Proof of Work: The process of finding this nonce is computationally intensive and requires significant energy and resources. Once a miner finds a valid nonce, they broadcast the newly mined block to the network.
3. Block Validation and Addition: Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid. If the block is valid, nodes add it to their copy of the blockchain and the process starts again with the next block.
4. Chain Consensus: The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain. In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group ("FFG") relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the "per transaction" count would be substantially higher.

S.5 Incentive Mechanisms and Applicable Fees

The Bitcoin blockchain relies on a Proof-of-Work (PoW) consensus mechanism to ensure the security and integrity of transactions. This mechanism involves economic incentives for miners and a fee structure that supports network sustainability:

Incentive Mechanisms:

1. Block Rewards:
   - Newly Minted Bitcoins: Miners are incentivized by block rewards, which consist of newly created bitcoins awarded to the miner who successfully mines a new block. Initially, the block reward was 50 BTC, but it halves every 210,000 blocks (approx. every four years) in an event known as the "halving."
   - Halving and Scarcity: The halving mechanism ensures that the total supply of Bitcoin is capped at 21 million, creating scarcity and potentially increasing value over time.
2. Transaction Fees:
   - User Fees: Each transaction includes a fee paid by the user to incentivize miners to include their transaction in a block. These fees are crucial, especially as the block reward diminishes over time due to halving.
   - Fee Market: Transaction fees are determined by the market, where users compete to have their transactions processed quickly. Higher fees typically result in faster inclusion in a block, especially during periods of high network congestion.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group ("FFG") relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the "per transaction" count would be substantially higher

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) bitcoin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

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Siacoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Siacoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	87614336.89081	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	1.58966	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	36096.76172	tCO2e
S.14 GHG intensity	0.65494	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Siacoin employs a Proof of Work (PoW) consensus mechanism to secure its decentralized storage network.

Core Components:

- Proof of Work (PoW): Miners validate transactions and secure the blockchain by solving computational puzzles using the PoW model.
- Blake2b Hashing Algorithm: The network relies on the Blake2b hashing algorithm, optimized for efficient and secure mining operations.
- ASIC Mining: Mining on the Siacoin network is most efficient using Application-Specific Integrated Circuits (ASICs) tailored for the Blake2b algorithm, promoting network stability through specialized hardware.

S.5 Incentive Mechanisms and Applicable Fees

Siacoin incentivizes miners and storage hosts while ensuring low-cost, secure transactions and storage services.

Incentive Mechanisms:

- Block Rewards: Miners earn SC as rewards for validating transactions and successfully adding new blocks to the blockchain, encouraging continuous participation in network security.

- Transaction Fees: Users pay transaction fees in SC for sending payments and interacting with the network. These fees compensate miners for processing transactions and maintaining network integrity.
- Host Collateral: Storage hosts must lock up SC as collateral when entering storage contracts. This ensures reliability and motivates hosts to fulfill their storage commitments, enhancing trust within the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Blake. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Quai

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Quai	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	84796800.00000	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.01408	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	34935.94761	tCO2e
S.14 GHG intensity	0.00580	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Quai employs a Proof of Entropy Minima (PoEM) consensus mechanism. This is a version of Proof of Work (PoW) with more efficient finality, i.e. conflict resolution in case multiple network nodes produce a new block almost at the same time. The PoW component uses an ASIC-resistant algorithm to promote decentralization and enable efficient mining.

Core Components:

- Proof of Work (PoW): Ensures network security and transaction validation by requiring miners to perform computational work.
- ProgPoW Algorithm: Utilizes an ASIC-resistant algorithm designed to allow mining with GPUs, encouraging broader participation and maintaining decentralization.
- Entropy Minima: Immediately resolves forks/achieves finality through an automated criterium that nodes can apply individually

S.5 Incentive Mechanisms and Applicable Fees

Quai incentivizes network security and transaction processing through block rewards and user fees/gas costs.

Incentive Mechanisms:

Block Rewards: Miners are rewarded with newly minted Quai tokens for successfully mining blocks and securing the blockchain.
Transaction Fees: Users pay fees/gas in Quai for transferring assets or executing operations, providing miners with additional compensation.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: None. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Dash

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Dash	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	67500000.80459	kWh/a
S.10 Renewable energy consumption	34.4781470956	%
S.11 Energy intensity	0.24714	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	27809.73446	tCO2e
S.14 GHG intensity	0.10182	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Dash is present on the following networks: Dash, Tron.

Dash combines Proof of Work (PoW) for block production with a masternode network, which adds enhanced services and governance. This hybrid approach enables Dash to offer both secure transaction validation and additional features like fast payments.

Core Components:

1. Proof of Work (PoW) with X11 Algorithm:
   Block Production: Miners use the X11 algorithm to solve cryptographic puzzles, with the first to solve adding the next block and receiving a block reward.
2. Masternode Network – Proof of Service (PoSe):
   - Collateral Requirement: Operating a masternode requires locking 1,000 DASH, which acts as collateral to secure services provided by the node.
   - Network Services: Masternodes support features such as InstantSend for rapid payments, PrivateSend for enhanced privacy, and governance.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

Dash is present on the following networks: Dash, Tron.

Dash rewards both miners and masternode operators to maintain network security and provide services, while also supporting community initiatives through a treasury fund.

Incentive Mechanisms:

1. Block Reward Distribution:
   - Miners: Receive 45% of each block reward for securing the network via PoW.
   - Masternodes: Earn 45% of each block reward, incentivizing them to operate and support network services.
   - Treasury Fund: 10% of each block reward is allocated to the Dash treasury, funding projects approved by the Dash DAO.
2. Masternode Staking and Rewards:
   Passive Income for Operators: By locking 1,000 DASH, masternode operators earn rewards for providing network services and participating in governance.

Applicable Fees:

- Standard Transactions: Users pay a small fee in DASH, making it suitable for daily transactions due to its low-cost structure.
- InstantSend Transactions: Available for a slightly higher fee, these transactions are processed immediately by masternodes for added security.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based

on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity generation - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

EthereumPOW

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	EthereumPOW	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	55531950.68634	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.01936	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	22878.94496	tCO2e
S.14 GHG intensity	0.00798	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Ethereum PoW employs the traditional Proof of Work (PoW) consensus mechanism, maintaining the original Ethereum blockchain's mining-based validation process after the transition to Proof of Stake (PoS) by the Ethereum mainnet.

Core Components:

- Proof of Work (PoW): Ethereum PoW secures its network through miners competing to solve cryptographic puzzles to validate transactions and produce new blocks. The mining process is computationally intensive, requiring significant energy consumption and specialized hardware (e.g., GPUs and ASICs).
- Ethash Algorithm: The blockchain uses the Ethash algorithm, designed to be memory-intensive and resistant to ASIC dominance, ensuring broader participation in mining by allowing GPUs to compete effectively.
- Block Production and Finality: New blocks are added to the blockchain by miners who successfully solve the cryptographic puzzle, with block rewards and transaction fees acting as incentives. Ethereum PoW achieves probabilistic finality, meaning transactions become increasingly irreversible as additional blocks are added to the chain.

S.5 Incentive Mechanisms and Applicable Fees

Ethereum PoW maintains the traditional incentive structure of Proof of Work, rewarding miners for securing the network and processing transactions, while users pay transaction fees for network operations.

Incentive Mechanism:

- Block Rewards: Miners earn block rewards in ETHW (Ethereum PoW tokens) for successfully mining new blocks and adding them to the blockchain. These rewards incentivize miners to dedicate computational power to secure the network.
- Transaction Fees: In addition to block rewards, miners receive transaction fees paid by users for executing transactions or interacting with smart contracts on the network. These fees are included in the blocks miners validate, providing an additional revenue stream.
- Deflationary Model: A portion of transaction fees (base fee) may be burned under the EIP-1559 model implemented in the original Ethereum chain, reducing the overall token supply over time and potentially increasing the value of ETHW.

Applicable Fees:

- Gas Fees: Users pay gas fees in ETHW for network transactions, which vary based on the complexity of the transaction and network demand. Gas fees include a base fee (burned) and a priority fee (paid to miners).
- Smart Contract Fees: Smart contract interactions incur additional gas costs, reflecting the computational resources required to execute the operations.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Etchash. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereumpow is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

MAGIC INTERNET MONEY



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	MAGIC INTERNET MONEY	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	49153256.27781	kWh/a
S.10 Renewable energy consumption	34.4781473023	%
S.11 Energy intensity	2.16653	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	20250.94782	tCO2e

Field	Value	Unit
S.14 GHG intensity	0.89260	kgCO2e

Qualitative information

S.4 Consensus Mechanism

MAGIC INTERNET MONEY is present on the following networks: Bitcoin, Solana.

The Bitcoin blockchain network uses a consensus mechanism called Proof of Work (PoW) to achieve distributed consensus among its nodes. Here's a detailed breakdown of how it works:

Core Concepts:

1. Nodes and Miners:
   - Nodes: Nodes are computers running the Bitcoin software that participate in the network by validating transactions and blocks.
   - Miners: Special nodes, called miners, perform the work of creating new blocks by solving complex cryptographic puzzles.
2. Blockchain: The blockchain is a public ledger that records all Bitcoin transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).
3. Hash Functions: Bitcoin uses the SHA-256 cryptographic hash function to secure the data in blocks. A hash function takes input data and produces a fixed-size string of characters, which appears random.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction must be validated by nodes to ensure it follows the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
   - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the SHA-256 hash function, produces a hash that is less than a target value. This target value is adjusted periodically to ensure that blocks are mined approximately every 10 minutes.
   - Proof of Work: The process of finding this nonce is computationally intensive and requires significant energy and resources. Once a miner finds a valid nonce, they broadcast the newly mined block to the network.
3. Block Validation and Addition: Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid. If the block is valid, nodes add it to their copy of the blockchain and the process starts again with the next block.
4. Chain Consensus: The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain. In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group (“FFG”) relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the “per transaction” count would be substantially higher.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.

- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

MAGIC INTERNET MONEY is present on the following networks: Bitcoin, Solana.

The Bitcoin blockchain relies on a Proof-of-Work (PoW) consensus mechanism to ensure the security and integrity of transactions. This mechanism involves economic incentives for miners and a fee structure that supports network sustainability:

Incentive Mechanisms:

1. Block Rewards:
   - Newly Minted Bitcoins: Miners are incentivized by block rewards, which consist of newly created bitcoins awarded to the miner who successfully mines a new block. Initially, the block reward was 50 BTC, but it halves every 210,000 blocks (approx. every four years) in an event known as the "halving."
   - Halving and Scarcity: The halving mechanism ensures that the total supply of Bitcoin is capped at 21 million, creating scarcity and potentially increasing value over time.
2. Transaction Fees:
   - User Fees: Each transaction includes a fee paid by the user to incentivize miners to include their transaction in a block. These fees are crucial, especially as the block reward diminishes over time due to halving.
   - Fee Market: Transaction fees are determined by the market, where users compete to have their transactions processed quickly. Higher fees typically result in faster inclusion in a block, especially during periods of high network congestion.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group (“FFG”) relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the “per transaction” count would be substantially higher

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) bitcoin, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house.

If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

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Lobo Dot The Dot Wolf Dot Pup

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Lobo Dot The Dot Wolf Dot Pup	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	22938185.18001	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	9.32899	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	9450.44195	tCO2e
S.14 GHG intensity	3.84351	kgCO2e

Qualitative information

S.4 Consensus Mechanism

The Bitcoin blockchain network uses a consensus mechanism called Proof of Work (PoW) to achieve distributed consensus among its nodes. Here's a detailed breakdown of how it works:

Core Concepts:

1. Nodes and Miners:
   - Nodes: Nodes are computers running the Bitcoin software that participate in the network by validating transactions and blocks.
   - Miners: Special nodes, called miners, perform the work of creating new blocks by solving complex cryptographic puzzles.
2. Blockchain: The blockchain is a public ledger that records all Bitcoin transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).
3. Hash Functions: Bitcoin uses the SHA-256 cryptographic hash function to secure the data in blocks. A hash function takes input data and produces a fixed-size string of characters, which appears random.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction must be validated by nodes to ensure it follows the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
   - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the SHA-256 hash function, produces a hash that is less than a target value. This target value is adjusted periodically to ensure that blocks are mined approximately every 10 minutes.
   - Proof of Work: The process of finding this nonce is computationally intensive and requires significant energy and resources. Once a miner finds a valid nonce, they broadcast the newly mined block to the network.
3. Block Validation and Addition: Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid. If the block is valid, nodes add it to their copy of the blockchain and the process starts again with the next block.
4. Chain Consensus: The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain. In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group (“FFG”) relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the “per transaction” count would be substantially higher.

S.5 Incentive Mechanisms and Applicable Fees

The Bitcoin blockchain relies on a Proof-of-Work (PoW) consensus mechanism to ensure the security and integrity of transactions. This mechanism involves economic incentives for miners and a fee structure that supports network sustainability:

Incentive Mechanisms:

1. Block Rewards:
   - Newly Minted Bitcoins: Miners are incentivized by block rewards, which consist of newly created bitcoins awarded to the miner who successfully mines a new block. Initially, the block reward was 50 BTC, but it halves every 210,000 blocks (approx. every four years) in an event known as the "halving."
   - Halving and Scarcity: The halving mechanism ensures that the total supply of Bitcoin is capped at 21 million, creating scarcity and potentially increasing value over time.
2. Transaction Fees:
   - User Fees: Each transaction includes a fee paid by the user to incentivize miners to include their transaction in a block. These fees are crucial, especially as the block reward diminishes over time due to halving.
   - Fee Market: Transaction fees are determined by the market, where users compete to have their transactions processed quickly. Higher fees typically result in faster inclusion in a block, especially during periods of high network congestion.

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S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) bitcoin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

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To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

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Pups Dot World Dot Peace

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Pups Dot World Dot Peace	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	18432477.00284	kWh/a
S.10 Renewable energy consumption	34.4781486159	%
S.11 Energy intensity	0.34921	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	7594.10743	tCO2e
S.14 GHG intensity	0.14387	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Pups Dot World Dot Peace is present on the following networks: Bitcoin, Solana.

The Bitcoin blockchain network uses a consensus mechanism called Proof of Work (PoW) to achieve distributed consensus among its nodes. Here's a detailed breakdown of how it works:

Core Concepts:

1. Nodes and Miners:
   - Nodes: Nodes are computers running the Bitcoin software that participate in the network by validating transactions and blocks.

- Miners: Special nodes, called miners, perform the work of creating new blocks by solving complex cryptographic puzzles.

2. Blockchain: The blockchain is a public ledger that records all Bitcoin transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).
3. Hash Functions: Bitcoin uses the SHA-256 cryptographic hash function to secure the data in blocks. A hash function takes input data and produces a fixed-size string of characters, which appears random.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction must be validated by nodes to ensure it follows the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
   - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the SHA-256 hash function, produces a hash that is less than a target value. This target value is adjusted periodically to ensure that blocks are mined approximately every 10 minutes.
   - Proof of Work: The process of finding this nonce is computationally intensive and requires significant energy and resources. Once a miner finds a valid nonce, they broadcast the newly mined block to the network.
3. Block Validation and Addition: Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid. If the block is valid, nodes add it to their copy of the blockchain and the process starts again with the next block.
4. Chain Consensus: The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain. In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group (“FFG”) relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the “per transaction” count would be substantially higher.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
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   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

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Transaction Fees:

1. Low and Predictable Fees:
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   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

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S.15 Key energy sources and methodologies

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billy

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	billy	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	16384419.02863	kWh/a
S.10 Renewable energy consumption	None	%
S.11 Energy intensity	None	kWh
S.12 Scope 1 DLT GHG emission - Controlled	None	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	None	tCO2e
S.14 GHG intensity	None	kgCO2e

Qualitative information

S.4 Consensus Mechanism

billy is present on the following networks: Bitcoin, Solana.

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Core Concepts:

1. Nodes and Miners:
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   - Proof of Work: The process of finding this nonce is computationally intensive and requires significant energy and resources. Once a miner finds a valid nonce, they broadcast the newly mined block to the network.
3. Block Validation and Addition: Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid. If the block is valid, nodes add it to their copy of the blockchain and the process starts again with the next block.
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Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
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   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

billy is present on the following networks: Bitcoin, Solana.

The Bitcoin blockchain relies on a Proof-of-Work (PoW) consensus mechanism to ensure the security and integrity of transactions. This mechanism involves economic incentives for miners and a fee structure that supports network sustainability:

Incentive Mechanisms:

1. Block Rewards:
   - Newly Minted Bitcoins: Miners are incentivized by block rewards, which consist of newly created bitcoins awarded to the miner who successfully mines a new block. Initially, the block reward was 50 BTC, but it halves every 210,000 blocks (approx. every four years) in an event known as the "halving."
   - Halving and Scarcity: The halving mechanism ensures that the total supply of Bitcoin is capped at 21 million, creating scarcity and potentially increasing value over time.
2. Transaction Fees:
   - User Fees: Each transaction includes a fee paid by the user to incentivize miners to include their transaction in a block. These fees are crucial, especially as the block reward diminishes over time due to halving.
   - Fee Market: Transaction fees are determined by the market, where users compete to have their transactions processed quickly. Higher fees typically result in faster inclusion in a block, especially during periods of high network congestion.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group (“FFG”) relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the “per transaction” count would be substantially higher

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) bitcoin, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

None

S.16 Key GHG sources and methodologies

None

Solana SOL

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Solana SOL	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	6843750.00000	kWh/a
S.10 Renewable energy consumption	38.5831139958	%
S.11 Energy intensity	0.00000	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	2319.13534	tCO2e
S.14 GHG intensity	0.00000	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Stacks

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Stacks	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	6586345.56140	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.01037	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	2713.54843	tCO2e
S.14 GHG intensity	0.00427	kgCO2e

Qualitative information

S.4 Consensus Mechanism

The Stacks blockchain, a Layer 2 solution on top of Bitcoin, uses a unique consensus mechanism called Proof of Transfer (PoX). PoX is inspired by Bitcoin's Proof of Work (PoW) and leverages Bitcoin's security by anchoring Stacks transactions on the Bitcoin blockchain.

Core Concepts of Proof of Transfer (PoX):

1. Recycling Bitcoin's Security:
   - Stacks utilizes Bitcoin's hash power and PoW energy by requiring Stacks miners to transfer BTC in exchange for the native token STX, essentially "recycling" Bitcoin's energy without additional mining.
   - Transactions on Stacks achieve Bitcoin finality—they are secured by Bitcoin's immutable blockchain.
2. Two-Layered Peg Mechanism:
   Stacks introduces a decentralized, trust-minimized peg called sBTC, allowing assets to move between Bitcoin and Stacks. b. This peg enables Stacks smart contracts to interact with Bitcoin securely and in a decentralized way, enhancing utility and enabling DeFi on Bitcoin.
3. Smart Contracts with Clarity Language:
   Stacks supports Clarity, a smart contract language designed for predictability and safety. Clarity contracts allow developers to know exactly what a contract will do before execution, ensuring security.
4. Miners and Stakers:
   Miners transfer BTC to earn newly minted STX, securing the network. b. STX Holders (stakers) are incentivized to lock up STX tokens, earning BTC rewards in return.

S.5 Incentive Mechanisms and Applicable Fees

The Stacks network incentivizes secure transactions and network participation through its unique Proof of Transfer (PoX) consensus model, which integrates incentives for both miners and STX holders.

Incentive Mechanisms to Secure Transactions:

1. Miners' Incentives:
   - BTC Transfers for Block Rewards: Stacks miners secure the network by transferring Bitcoin (BTC) to compete for the opportunity to mine a new block and earn STX rewards. This transfer of BTC ensures miners are vested in the network's security without directly consuming additional computational power.
   - Newly Minted STX Rewards: Miners who successfully mine a block are rewarded with newly minted STX tokens. This reward incentivizes miners to continue participating in securing the Stacks network.
   - Bitcoin Finality: Since Stacks blocks are anchored to Bitcoin, the network leverages Bitcoin's security to ensure finality, meaning that once transactions are confirmed on Bitcoin, they are considered immutable and secure.
2. Incentives for STX Holders (Stacking Rewards):
   - Stacking BTC Rewards: STX holders can participate in the consensus process through a mechanism called Stacking. By locking up (temporarily holding) their STX tokens, these participants contribute to network stability and security. In return, they receive BTC rewards paid by the miners.
   - Decentralization and Security Contribution: The Stacking process promotes decentralization by encouraging broad participation from STX holders, who help maintain network stability and security. This model reduces reliance on a few large players and provides economic rewards for active participation.
3. Two-Layered Peg and Decentralized Utility:
   By utilizing a two-way peg mechanism, the Stacks network allows BTC to be moved between Bitcoin and Stacks, enabling secure, decentralized transactions. This enhances the overall utility of the network, encouraging more users and developers to participate in the ecosystem.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

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S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

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Internet Computer Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Internet Computer Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	5834160.00000	kWh/a
S.10 Renewable energy consumption	35.9000000000	%
S.11 Energy intensity	0.00720	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	2047.79016	tCO2e
S.14 GHG intensity	0.00253	kgCO2e

Qualitative information

S.4 Consensus Mechanism

The Internet Computer Protocol (ICP) uses a unique consensus mechanism called Threshold Relay combined with Chain Key Technology to ensure decentralized, scalable, and secure operations for its network.

Core Components of ICP's Consensus Mechanism:

1. Threshold Relay:
   Threshold Relay is a consensus protocol that enables the network to achieve finality without a traditional Proof-of-Work or Proof-of-Stake mechanism. It leverages a group of nodes called "the committee" to generate a random beacon that is used for the selection of the next block producer. The protocol is designed to provide scalability and speed while maintaining decentralization by allowing any node to join the consensus process. The key feature of Threshold Relay is that it utilizes a threshold signature scheme, where a group of nodes must collaborate to create a valid signature, ensuring that consensus is achieved even in the presence of faulty or malicious nodes.
2. Chain Key Technology:
   Chain Key Technology is used to manage the state of the Internet Computer, allowing it to scale effectively across a vast number of nodes while still providing fast and secure transaction finality. This technology enables the creation and management of many independent blockchains (also known as subnet blockchains), each with its own set of validators. Chain Key Technology allows the Internet Computer to support billions of smart contracts without compromising speed, as it facilitates quick communication between the subnets and enables cross-chain interoperability.
3. Canister Smart Contracts:
   - The Internet Computer utilizes a decentralized model where the computation of canister smart contracts (which hold the application logic) occurs across different nodes in the network. These canisters can run autonomously and scale with the network's growth.

- Finality and Security: The consensus mechanism ensures finality once a transaction is validated, meaning that once a block is added, it cannot be reverted, providing the security required for high-stakes applications. The use of Threshold Relay provides robust Byzantine Fault Tolerance (BFT), enabling the network to tolerate faulty or malicious behavior without compromising network integrity.

S.5 Incentive Mechanisms and Applicable Fees

The Internet Computer Protocol (ICP) incentivizes network participants (validators, node operators, and canister developers) through various reward mechanisms and transaction fees. Here's a breakdown of the incentive mechanisms and applicable fees related to ICP:

Incentive Mechanism:

1. Network Participation and Rewards:
   - Validators: Validators are crucial for maintaining the integrity and security of the network. They stake ICP tokens to participate in consensus and are rewarded for validating blocks, maintaining the integrity of the decentralized network, and ensuring its performance. Rewards for validators are based on their participation in the consensus mechanism and their stake in the network.
   - Node Operators: Node operators who maintain the physical infrastructure of the network (such as hardware and server resources) are also rewarded. These operators run the nodes that participate in the Threshold Relay and provide computational power to the network.
2. Canister Developers and Network Participants:
   - Canister Smart Contracts: Developers of canisters (smart contracts) on the Internet Computer are incentivized through the creation of decentralized applications (dApps). Developers may also benefit from transaction fees generated by the usage of their dApps and the deployment of smart contracts on the network.
   - Usage Fees: Users of decentralized applications (dApps) or canisters are incentivized to pay for their usage through fees. These fees are often paid in ICP tokens, and developers can receive a share of these fees based on the usage of their deployed applications.
3. Governance:
   The ICP Token is used for governance via the Network Nervous System (NNS), where holders of ICP tokens participate in decisions regarding the protocol, such as network upgrades, incentive adjustments, and the allocation of funds. Token holders are rewarded with the ability to influence the future of the network.
4. Staking Rewards:
   Staking: ICP token holders can participate in staking their tokens in the NNS, which influences network consensus and governance. By participating in staking, they help secure the network and are rewarded with staking rewards (a form of passive income). The staking rewards are given to token holders who participate in securing the network via the NNS.

Applicable Fees:

1. Transaction Fees:
   - Canister Calls: Every interaction with a canister (smart contract) on the Internet Computer incurs a transaction fee. These fees are typically paid in ICP tokens and are used to cover the computational resources required to process requests, store data, and manage execution.
   - Fee Structure: Transaction fees depend on the complexity and resources consumed by the canister call or network operation. For example, operations that require more computational power or data storage may incur higher fees.
2. Storage Fees:
   Canister Data Storage: Developers and users who deploy applications on the Internet Computer are required to pay fees for storing data. These fees ensure that network resources are used

efficiently and that canisters do not waste storage space. The cost of storage is typically paid in ICP tokens.

3. Governance Participation Fees:
   Voting and Proposal Fees: Participation in the governance process via the NNS (Network Nervous System) may require a small fee, depending on the type of governance action (such as submitting a proposal or voting). These fees ensure that governance is distributed and prevent spam attacks on the governance system.
4. Node and Validator Fees:
   Fees for Node Operations: Node operators who provide computational power to the network may incur costs related to maintaining hardware and operating nodes. These fees are partially offset by rewards for providing network resources.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) internet_computer is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

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S.16 Key GHG sources and methodologies

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TRON TRX

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	TRON TRX	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	4027257.71769	kWh/a
S.10 Renewable energy consumption	33.4000000000	%
S.11 Energy intensity	0.00002	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	1582.71228	tCO2e
S.14 GHG intensity	0.00001	kgCO2e

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism.

This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Filecoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Filecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	2409026.68737	kWh/a
S.10 Renewable energy consumption	37.9124162347	%
S.11 Energy intensity	0.00178	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	801.75636	tCO2e
S.14 GHG intensity	0.00059	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Filecoin is present on the following networks: Binance Smart Chain, Filecoin, Huobi.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Filecoin's consensus mechanism, Expected Consensus (EC), is designed to reward data storage providers based on the amount of storage they contribute.

Core Components of Expected Consensus (EC):

1. Storage Power-Based Block Production:
   Probabilistic Block Selection: Block producers (miners) are chosen probabilistically based on their storage power, meaning providers with more storage capacity have higher chances of being selected to produce new blocks.
2. Proof of Replication (PoRep):
   Initial Data Verification: Miners provide cryptographic Proof of Replication to verify they are uniquely storing clients' data at the start of each storage contract.
3. Proof of Spacetime (PoSt):
   Ongoing Verification: Miners periodically submit Proof of Spacetime to confirm they continue to store data over the contract's duration, maintaining data availability and integrity.
4. Chain Quality and Fork Choice:
   Chain Quality Rule: In cases of chain splits, the network follows the chain with the highest cumulative storage power, ensuring security by selecting the most robust chain.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Key Features of HECO's Consensus Mechanism:

1. Validator Selection: HECO supports up to 21 validators, selected based on their stake in the network.
2. Transaction Processing: Validators are responsible for processing transactions and adding blocks to the blockchain.
3. Transaction Finality: The consensus mechanism ensures quick finality, allowing for rapid confirmation of transactions.
4. Energy Efficiency: By utilizing PoS elements, HECO reduces energy consumption compared to traditional Proof-of-Work systems.

S.5 Incentive Mechanisms and Applicable Fees

Filecoin is present on the following networks: Binance Smart Chain, Filecoin, Huobi.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Filecoin incentivizes storage providers (miners) to maintain data integrity and make decentralized storage available through block rewards and storage fees.

Incentive Mechanisms:

1. Block Rewards:
   - Storage-Based Block Rewards: Block rewards in FIL (Filecoin's native token) are given to storage providers selected to add new blocks, proportional to their storage power. These rewards incentivize providers to contribute more storage to the network, enhancing security and decentralized data availability.
   - Reward Distribution: Providers with higher storage capacity receive rewards more frequently, creating a direct economic incentive to offer larger storage volumes.
2. Storage Fees:
   - Client Payments: Clients pay storage providers (miners) in FIL tokens to store data, incentivizing providers to offer reliable storage.
   - Market Pricing: Storage costs are determined by supply and demand, allowing competitive, flexible pricing based on network conditions.

3. Data Retrieval Payments:
   In addition to storage fees, miners can earn retrieval fees for providing data access to clients. These fees incentivize storage providers to make stored data readily accessible, enabling Filecoin to support efficient, decentralized data retrieval services.
4. Slashing and Penalties:
   - If a miner fails to provide Proof of Spacetime, they may face slashing penalties, losing a portion of their FIL collateral. This mechanism disincentivizes data tampering or deletion by holding providers accountable to their storage commitments.
   - Client Refunds: In cases of missed proofs, clients may receive refunds or compensations, ensuring that the network maintains a high standard of data reliability and provider accountability.

Applicable Fees:

1. Transaction Fees:
   Filecoin charges transaction fees for standard network operations, paid in FIL. These fees help maintain network functionality and discourage spam by aligning costs with network resource usage.
2. Gas Fees:
   Miners pay gas fees based on the computational resources required to submit PoRep and PoSt proofs. These fees are integral to the network's operation, ensuring that participants contribute fairly to Filecoin's resource demands.
3. Storage and Retrieval Fees:
   Clients pay miners for data storage on a contract basis, and retrieval fees are paid when miners deliver data on request. These fees are tailored to the type and duration of storage services, providing flexibility in data pricing and availability.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Incentive Mechanism:

1. Validator Rewards:
   Validators are selected based on their stake in the network. They process transactions and add blocks to the blockchain. Validators receive rewards in the form of transaction fees for their role in maintaining the blockchain's integrity.
2. Staking Participation:
   Users can stake Huobi Token (HT) to become validators or delegate their tokens to existing validators. Staking helps secure the network and, in return, participants receive a portion of the transaction fees as rewards.

Applicable Fees:

1. Transaction Fees (Gas Fees):
   Users pay gas fees in HT tokens to execute transactions and interact with smart contracts on the HECO network. These fees compensate validators for processing and validating transactions.
2. Smart Contract Execution Fees:
   Deploying and interacting with smart contracts incur additional fees, which are also paid in HT tokens. These fees cover the computational resources required to execute contract code.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, huobi is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity generation - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Ethereum Eth

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ethereum Eth	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2159953.20000	kWh/a
S.10 Renewable energy consumption	37.9124101186	%
S.11 Energy intensity	0.00005	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	718.86066	tCO2e
S.14 GHG intensity	0.00002	kgCO2e

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity generation - Ember and Energy Institute”

[dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Qubic

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Qubic	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1909680.00000	kWh/a
S.10 Renewable energy consumption	37.9124101186	%
S.11 Energy intensity	0.01090	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	635.56646	tCO2e
S.14 GHG intensity	0.00363	kgCO2e

Qualitative information

S.4 Consensus Mechanism

The Qubic blockchain utilizes a Proof-of-Work algorithm called Quorum-Based Computation (QBC), designed to combine decentralization, efficiency, and adaptability for secure transaction and smart contract execution.

Core Components:

- Quorum-Based Computation (QBC):
  Decisions require agreement from at least 451 out of the top 676 Computors, ensuring reliable and decentralized consensus for transaction validation and smart contract execution.
- Useful Proof-of-Work (uPoW):
  AI miners compete to solve computational tasks, determining the ranking of Computors for each epoch (one week). The top-performing Computors qualify to participate in consensus, fostering a dynamic and performance-driven network.
- Spectrum Ledger:
  Qubic's equivalent of a blockchain ledger, the Spectrum records validated transactions and smart contract outcomes, ensuring integrity and transparency.
- Dynamic and Adaptive Selection:
  Computors are continually reassessed and ranked based on their performance. Computors unable to meet the network’s speed or efficiency standards are replaced, maintaining high operational quality.

- Decentralization and Autonomy:
  All major decisions, including transaction validation and smart contract execution, are governed by the quorum of Computors, with no single entity having overriding authority.

S.5 Incentive Mechanisms and Applicable Fees

The Qubic blockchain's incentive mechanism and fee structure are designed to reward performance and ensure efficient network operations while maintaining fairness and decentralization.

Incentive Mechanism:

- Revenue for Computors: Qualified Computors earn revenue by validating transactions and executing smart contracts on the Spectrum ledger. Computors are rewarded based on their performance, including transaction processing speed and network compatibility.
- Useful Proof-of-Work (uPoW): AI miners earn recognition by solving computational tasks, ranking Computors for eligibility in the consensus process. While mining does not directly validate transactions, it incentivizes AI innovation and supports the Aigarth ecosystem.
- Performance-Based Rewards: Computors demonstrating consistent speed and compatibility are prioritized, ensuring that high-performance nodes are rewarded. Computors that fail to keep pace are replaced, maintaining network efficiency.

Applicable Fees:

- Transaction Fees: Users pay transaction fees for executing transfers and smart contracts. These fees are distributed among the participating Computors, incentivizing their active involvement in network operations.
- Dynamic Fee Structure: Fees are adjusted based on network demand and transaction complexity, balancing user costs with network sustainability.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism.

This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Toncoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Toncoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1419120.00000	kWh/a
S.10 Renewable energy consumption	37.9124101186	%
S.11 Energy intensity	0.00003	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	472.30168	tCO2e
S.14 GHG intensity	0.00001	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Toncoin utilizes a Proof of Stake (PoS) model with the Catchain consensus algorithm to provide a secure, scalable, and efficient multi-chain environment.

Core Components of Toncoin's Consensus:

1. Proof of Stake (PoS) with Validators:
   Validator Role: Validators are required to stake Toncoin to participate in consensus. They validate transactions and secure the network by processing blocks and maintaining network integrity.
2. Catchain Consensus Algorithm:
   - High Scalability and Speed: The Catchain consensus protocol is specifically designed for Toncoin's multi-chain architecture, optimizing for fast and scalable operations across multiple shards.
   - Multi-Chain Compatibility: Catchain supports a sharded environment, allowing different chains (or shards) to reach consensus efficiently. This approach enhances the network's ability to process a high volume of transactions in parallel.
3. Byzantine Fault Tolerance (BFT):
   Fault Tolerance: The Catchain protocol is Byzantine Fault Tolerant (BFT), meaning it can tolerate some level of malicious or faulty behavior among validators. This BFT compliance ensures that the network remains secure and functional even when a minority of validators act maliciously.
4. Validator Rotation and Slashing:
   - Regular Rotation: Validators are rotated regularly to enhance decentralization and security. This system prevents any single validator or group from maintaining control over consensus indefinitely.
   - Slashing for Malicious Behavior: Validators who act maliciously or fail to perform their duties may be penalized through slashing, losing a portion of their staked Toncoin. This discourages dishonest behavior and promotes reliable network participation.

S.5 Incentive Mechanisms and Applicable Fees

Toncoin incentivizes network security, participation, and efficiency through staking rewards, transaction fees, and slashing penalties.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   Rewards for Securing the Network: Validators earn staking rewards for actively participating in the network's consensus process and ensuring its security. These rewards are provided in Toncoin and are proportional to each validator's staked amount, encouraging validators to maintain their roles responsibly.
2. Transaction Fees:
   Ongoing Income for Validators: Validators also receive a share of transaction fees from the blocks they validate, providing a consistent reward that grows with network usage. This additional income incentivizes validators to process transactions accurately and efficiently.
3. Decentralization through Validator Rotation:
   Fair and Balanced Participation: The frequent rotation of validators ensures that new participants can join the validator set, promoting decentralization and preventing monopolization of the network by a small group of validators.

4. Slashing Mechanism:
   Penalties for Dishonest Behavior: To maintain security, Toncoin enforces a slashing mechanism that penalizes validators who act maliciously or fail to fulfill their duties. This risk of losing staked Toncoin encourages validators to behave honestly and fulfill their responsibilities.

Applicable Fees:

Transaction Fees: Transaction fees on the TON blockchain are paid in Toncoin. These fees vary based on transaction complexity and network demand, ensuring that validators are compensated for their work and that resources are efficiently utilized.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity generation - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

NEAR Protocol

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	NEAR Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	919965.48490	kWh/a
S.10 Renewable energy consumption	37.4188508587	%
S.11 Energy intensity	0.00001	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	309.80494	tCO2e
S.14 GHG intensity	0.00001	kgCO2e

Qualitative information

S.4 Consensus Mechanism

NEAR Protocol is present on the following networks: Binance Smart Chain, Ethereum, Near Protocol.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

S.5 Incentive Mechanisms and Applicable Fees

NEAR Protocol is present on the following networks: Binance Smart Chain, Ethereum, Near Protocol.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.

- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.
2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best

effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

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S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Avalanche AVAX

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Avalanche AVAX	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	818291.20653	kWh/a
S.10 Renewable energy consumption	36.3152910542	%

Field	Value	Unit
S.11 Energy intensity	0.00004	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	307.24037	tCO2e
S.14 GHG intensity	0.00002	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Avalanche AVAX is present on the following networks: Avalanche, Avalanche X Chain.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

The Avalanche X-Chain uses the Avalanche consensus protocol, which relies on repeated subsampling of validators to reach agreement on transactions.

S.5 Incentive Mechanisms and Applicable Fees

Avalanche AVAX is present on the following networks: Avalanche, Avalanche X Chain.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Validator incentives on the X-Chain are indirect and come from network-wide AVAX issuance. Transaction fees are fixed and burned to prevent spam and reduce the total supply of AVAX over time

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, avalanche_x_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity generation - Ember and Energy Institute”

[dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Cardano ADA

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Cardano ADA	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	773946.00000	kWh/a
S.10 Renewable energy consumption	37.4187578605	%
S.11 Energy intensity	0.00109	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	260.63169	tCO2e
S.14 GHG intensity	0.00037	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Core Components: Cardano uses the Ouroboros consensus mechanism, a Proof of Stake (PoS) protocol designed for scalability, security, and energy efficiency.

Core Concepts:

1. Proof of Stake (PoS): Validators (called slot leaders) are selected based on the amount of ADA they have staked, rather than solving complex computational puzzles. Validators propose and validate blocks, which are added to the blockchain.
2. Epochs and Slot Leaders: Cardano divides time into epochs (fixed time periods), each of which is subdivided into slots. Slot leaders are selected for each slot to validate and propose blocks. Slot leaders are chosen randomly based on the amount of ADA staked. More stake increases the probability of being selected. Validators are responsible for confirming transactions during their slot and passing the block to the next slot leader.
3. Delegation and Staking Pools: ADA holders can delegate their tokens to staking pools, which increases the pool’s chances of being selected to validate a block. The pool operator and delegators share the rewards based on their stakes. This system ensures that participants who do not want to operate a full validator node can still earn rewards and contribute to network security by supporting trusted staking pools.
4. Security and Adversary Resistance: Ouroboros ensures security even in the presence of potential attacks. It assumes that adversaries may attempt to propagate alternative chains or send

arbitrary messages. The protocol is secure as long as more than 51% of the staked ADA is controlled by honest participants. Settlement Delay: To protect against adversarial attacks, the new slot leader must consider the last few blocks as transient. Only the blocks preceding these are treated as finalized, ensuring that chain finality is secure against manipulation attempts. This mechanism also allows participants to temporarily go offline and resynchronize as long as they are not disconnected for more than the settlement delay period.

5. Chain Selection: Cardano's nodes adopt the longest valid chain rule: each node stores a local copy of the blockchain and replaces it with any discovered valid, longer chain. This ensures that all nodes eventually converge on a single version of the blockchain, maintaining network consistency.

S.5 Incentive Mechanisms and Applicable Fees

Cardano uses incentive mechanisms to ensure network security and decentralization through staking rewards, slashing mechanisms, and transaction fees.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   - Validators, known as slot leaders, secure the network by validating transactions and creating new blocks. To participate, validators must stake ADA, and those with larger stakes are more likely to be selected as slot leaders.
   - Validators are rewarded with newly minted ADA and transaction fees for successfully producing blocks and validating transactions.
   - Delegators, who may not wish to run a validator node, can delegate their ADA to staking pools. By doing so, they contribute to the network's security and earn a share of the rewards earned by the pool. The rewards are distributed proportionally based on the amount of ADA delegated.
2. Slashing Mechanism:
   - To prevent malicious behavior, Cardano employs a slashing mechanism. Validators who act dishonestly, fail to validate transactions properly, or produce incorrect blocks face penalties that involve the slashing of a portion of their staked ADA.
   - This provides strong economic incentives for validators to act honestly and ensures the network's integrity and security.
3. Delegation and Pool Operation:
   - Staking pools can charge operation fees (a margin on rewards) to maintain their infrastructure. This includes fixed costs set by pool operators. Delegators earn rewards after pool fees are deducted, providing a balanced incentive for both operators and delegators to participate actively.
   - Rewards are distributed at the end of each epoch, where staking pool performance and participation determine the distribution of ADA rewards to all stakeholders.

Applicable Fees:

1. Transaction Fees:
   - Transaction fees on Cardano are paid in ADA and are generally low. They are calculated based on the size of the transaction and the network's current demand. These fees are paid to validators for including transactions in new blocks.
   - The fee formula is: $a + b \times size$, where a is a constant (typically 0.155381 ADA), b is a coefficient related to the transaction size (0.000043946 ADA/byte), and size refers to the transaction size in bytes. This ensures that the fee adapts based on network load and the size of each transaction.

2. Staking Pool Fees:
   - Staking pool operators charge operational costs and a margin fee, which covers the cost of running and maintaining the staking pool. These fees vary between pools but ensure that operators can continue to provide their services while offering rewards to delegators.
   - After the operator's fee, the remaining rewards are distributed among the delegators based on the size of their stake.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

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S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

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MultiversX EGLD

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	MultiversX EGLD	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	716130.44757	kWh/a
S.10 Renewable energy consumption	34.4781499346	%
S.11 Energy intensity	0.00033	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	295.04291	tCO2e
S.14 GHG intensity	0.00013	kgCO2e

Qualitative information

S.4 Consensus Mechanism

MultiversX EGLD is present on the following networks: Binance Smart Chain, Multiversx.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

MultiversX employs a consensus model called Secure Proof of Stake (SPoS), which integrates elements of Proof of Stake (PoS) with a rapid, randomized validator selection process. SPoS enables efficient and scalable consensus with high throughput and low latency.

Core Components:

1. Secure Proof of Stake (SPoS):
   - Randomized Validator Selection: Validators are selected in under 100 milliseconds based on their stake, with a quick rotation to maintain efficiency and prevent centralization.
   - Validator and Observer Nodes: Validator nodes process transactions and produce blocks, while Observer nodes are read-only, providing data access and network monitoring.
2. Adaptive State Sharding:
   Parallel Transaction Processing: Adaptive State Sharding splits the network into shards, allowing for simultaneous transaction processing across multiple shards, which enhances scalability and network performance.
3. Meta Chain Coordination:
   Cross-Shard Finalization: The Meta Chain manages cross-shard transactions, finalizing blocks and ensuring data consistency between shards.

S.5 Incentive Mechanisms and Applicable Fees

MultiversX EGLD is present on the following networks: Binance Smart Chain, Multiversx.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

MultiversX incentivizes network participation through staking rewards and transaction fees, supporting network security and performance.

Incentive Mechanisms:

Staking Rewards for Validators and Delegators:
- Validator Rewards: Validators earn EGLD tokens for processing transactions and producing blocks.
- Delegation Rewards: EGLD holders can delegate their tokens to validators to receive a portion of the staking rewards without managing a node.

Applicable Fees:

1. Transaction Fees:
   Fee Structure: Fees are paid in EGLD and vary based on transaction complexity and size, covering smart contract execution, asset transfers, and other network interactions.
2. Delegation Opportunities:
   Passive Staking for EGLD Holders: EGLD holders who delegate their tokens share in staking rewards, supporting network security and earning passive income.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

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S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

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Polkadot DOT

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Polkadot DOT	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	630720.00000	kWh/a
S.10 Renewable energy consumption	39.0267442857	%
S.11 Energy intensity	0.00004	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	186.14368	tCO2e
S.14 GHG intensity	0.00001	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Polkadot DOT is present on the following networks: Astar, Polkadot.

Astar uses a hybrid consensus mechanism that combines Proof of Stake (PoS) and Delegated Proof of Stake (DPoS), with the added feature of Sharded Multichain capabilities. The primary goal is to provide a scalable, interoperable, and decentralized platform for building decentralized applications (dApps), which can run on multiple blockchains in parallel.

Key Features of Astar's Consensus Mechanism:

1. Proof of Stake (PoS): In Astar, validators participate by staking ASTR tokens, the native currency of the network. The more tokens staked, the higher the chances of being selected as a validator. Validators are responsible for validating transactions and securing the network. Validators receive block rewards for their efforts, which are paid in ASTR tokens.
2. Delegated Proof of Stake (DPoS): Astar incorporates DPoS to allow ASTR token holders to vote for validators. Token holders delegate their voting power to trusted validators, who then produce blocks and validate transactions. This ensures greater decentralization by allowing the community to have a direct say in who validates the network. Delegators receive a share of the block rewards earned by their selected validators.
3. Sharded Multichain: Astar's consensus mechanism allows for multichain execution via Parachains in the Polkadot ecosystem, enabling Astar to process multiple parallel chains and increase scalability. This sharding mechanism ensures that Astar can scale effectively, maintaining high throughput while decentralizing the network.
4. Finality: Astar leverages Polkadot's GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) finality gadget for fast and deterministic finality. Once a block is finalized, it is irreversible, ensuring the integrity and security of transactions.

Polkadot, a heterogeneous multi-chain framework designed to enable different blockchains to interoperate, uses a sophisticated consensus mechanism known as Nominated Proof-of-Stake (NPoS). This mechanism combines elements of Proof-of-Stake (PoS) and a layered consensus model involving multiple roles and stages.

Core Components:

1. Validators: Validators are responsible for producing new blocks and finalizing the relay chain, Polkadot's main chain. They stake DOT tokens and validate transactions, ensuring the security and integrity of the network.
2. Nominators: Nominators delegate their stake to trusted validators, choosing which validators they believe will act honestly and effectively. They share in the rewards and penalties of the validators they nominate.
3. Collators: Collators maintain parachains (individual blockchains that connect to the Polkadot relay chain) by collecting transactions from users and producing state transition proofs for validators.
4. Fishermen: Fishermen monitor the network for malicious activity. They report bad behavior to the validators to help maintain network security.

Consensus Process: Polkadot's consensus mechanism operates through a combination of two key protocols: GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) and BABE (Blind Assignment for Blockchain Extension).

1. BABE (Block Production): BABE is the block production mechanism. It operates similarly to a lottery, where validators are pseudo-randomly assigned slots to produce blocks based on their stake. Each validator signs the blocks they produce, which are then propagated through the network.
2. GRANDPA (Finality): GRANDPA is the finality gadget that provides a higher level of security by finalizing blocks after they are produced. Unlike traditional blockchains where blocks are considered final after a number of confirmations, GRANDPA allows for asynchronous finality. Validators vote on chains, and once a supermajority agrees, the chain is finalized instantly.

Detailed Steps:

1. Block Production (BABE):
   - Slot Allocation: Validators are selected to produce blocks in specific time slots.

- Block Proposal: The selected validator for a slot proposes a block, including new transactions and state changes.

2. Block Propagation and Preliminary Consensus: Proposed blocks are propagated across the network, where other validators verify the correctness of the transactions and state transitions.
3. Finalization (GRANDPA):
   - Voting on Blocks: Validators vote on the chains they believe to be the correct history.
   - Supermajority Agreement: Once more than two-thirds of validators agree on a block, it is finalized.
   - Instant Finality: This finality process ensures that once a block is finalized, it is irreversible and becomes part of the canonical chain.
4. Rewards and Penalties: Validators and nominators earn rewards for participating in the consensus process and maintaining network security. Misbehavior, such as producing invalid blocks or being offline, results in penalties, including slashing of staked tokens.

S.5 Incentive Mechanisms and Applicable Fees

Polkadot DOT is present on the following networks: Astar, Polkadot.

Astar incentivizes network participation through block rewards, transaction fees, and staking rewards while encouraging governance via delegated voting.

Incentive Mechanism:

1. Staking Rewards: Validators earn ASTR tokens for validating transactions and securing the network. The more tokens staked, the higher the chances of validating blocks.
2. Delegated Proof of Stake (DPoS): ASTR token holders can delegate their tokens to validators, sharing in the rewards based on the performance of their chosen validators.
3. Cross-Chain dApp Rewards: Developers deploying dApps on Astar earn rewards for using the network's multichain capabilities.
4. Governance Participation: ASTR token holders participate in on-chain governance to vote on proposals and protocol changes.

Applicable Fees:

1. Transaction Fees: Users pay fees in ASTR tokens for transactions. These are collected by validators who process the transactions.
2. dApp Execution Fees: Developers pay for smart contract execution based on resource demands.
3. Cross-Chain Fees: Additional fees apply for asset transfers and interactions between different blockchain networks.
4. Parachain Slot Fees: Astar incurs fees for its parachain slot on the Polkadot network to ensure interoperability.

Polkadot uses a consensus mechanism called Nominated Proof-of-Stake (NPoS), which involves a combination of validators, nominators, and a unique layered consensus process to secure the network:

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are responsible for producing new blocks and finalizing the relay chain. They are incentivized with staking rewards, which are distributed in proportion to their stake and their performance in the consensus process. Validators earn these rewards for maintaining uptime and correctly validating transactions.

- Commission: Validators can set a commission rate that they charge on the rewards earned by their nominators. This incentivizes them to perform well to attract more nominators.

2. Nominators:
   - Delegation: Nominators stake their tokens by delegating them to trusted validators. They share in the rewards earned by the validators they support. This mechanism incentivizes nominators to carefully choose reliable validators.
   - Rewards Distribution: The rewards are distributed among validators and their nominators based on the amount of stake contributed by each party. This ensures that both parties are incentivized to maintain the network's security.
3. Collators:
   Parachain Maintenance: Collators maintain parachains by collecting transactions and producing state transition proofs for validators. They are incentivized through rewards for their role in keeping the parachain operational and secure.
4. Fishermen:
   Monitoring: Fishermen are responsible for monitoring the network for malicious activities. They are rewarded for identifying and reporting malicious behavior, which helps maintain the network's security.
5. Economic Penalties:
   - Slashing: Validators and nominators face penalties in the form of slashing if they engage in malicious activities such as double-signing or being offline for extended periods. Slashing results in the loss of a portion of their staked tokens, which serves as a strong deterrent against bad behavior.
   - Unbonding Period: To withdraw staked tokens, participants must go through an unbonding period during which their tokens are still at risk of being slashed. This ensures continued network security even when validators or nominators decide to exit.

Fees on the Polkadot Blockchain:

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Polkadot are dynamic, adjusting based on network demand and the complexity of the transaction. This model ensures that fees remain fair and proportional to the network's usage.
   - Fee Burn: A portion of the transaction fees is burned (permanently removed from circulation), which helps to control inflation and can potentially increase the value of the remaining tokens.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Polkadot are based on the computational resources required. This encourages efficient use of network resources.
3. Parachain Slot Auction Fees:
   Bidding for Slots: Projects that want to secure a parachain slot must participate in a slot auction. They bid DOT tokens, and the highest bidders win the right to operate a parachain for a specified period. This process ensures that only serious projects with significant backing can secure parachain slots, contributing to the network's overall quality and security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The

energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) astar is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

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Flow

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Flow	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	526695.00000	kWh/a
S.10 Renewable energy consumption	37.9124101186	%
S.11 Energy intensity	0.00029	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	175.29098	tCO2e
S.14 GHG intensity	0.00010	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Flow employs a Proof of Stake (PoS) model with a multi-role node architecture and the HotStuff Byzantine Fault Tolerant (BFT) protocol to achieve high throughput, scalability, and fast finality.

Core Components of Flow's Consensus:

1. Proof of Stake with Multi-Role Architecture:
   Specialized Node Roles: Flow's PoS model features a multi-node architecture where node roles are divided among different types of specialized nodes, each responsible for specific tasks. This separation enhances scalability by allowing nodes to focus on particular operations, leading to efficient transaction processing and high throughput.
2. HotStuff Consensus Algorithm:
   - Optimized for High Throughput and Fast Finality: Flow utilizes an optimized version of the HotStuff consensus protocol, which is designed to support high-speed, low-latency transactions essential for Flow's performance-oriented blockchain.
   - BFT Compliance: HotStuff is a BFT protocol, allowing it to tolerate up to one-third of nodes acting maliciously without compromising the network's security. This resilience ensures the network remains secure and functional, even with potential faults or dishonest nodes.
3. Leader-Based Block Proposal:
   - Leader and Replica Nodes: HotStuff operates with a leader-based approach where a designated leader node proposes new blocks, and other nodes (replicas) validate these blocks. This method simplifies the consensus process, reducing complexity and improving efficiency.
   - Leader Rotation Mechanism: To prevent centralization and enhance fault tolerance, HotStuff incorporates a leader rotation system, replacing the leader if it becomes unresponsive or acts maliciously. This rotation ensures continuous network reliability and minimizes downtime.

S.5 Incentive Mechanisms and Applicable Fees

Flow's incentive model rewards validator nodes, supports ecosystem growth, and maintains affordable fees for developers and users.

Incentive Mechanisms:

1. Staking Rewards for Specialized Nodes:
   Role-Based Rewards: Validators earn Flow tokens according to their specific roles and contributions within the multi-node architecture, aligning rewards with each node's responsibilities to encourage balanced and effective network participation.
2. Transaction Fees:
   Stable and Consumer-Friendly Fees: Flow's fee structure is designed for predictability, keeping transaction costs stable for both developers and users. Fees are based on transaction complexity and provide an ongoing income stream for validators.
3. Misbehavior Penalties:
   Penalties for Downtime or Malicious Behavior: To maintain network stability, Flow imposes penalties on validators for misbehavior or downtime. This incentivizes high-quality validator participation and ensures consistent performance.
4. Ecosystem and Developer Support:
   Dedicated Portion of Fees and Rewards: A portion of Flow's transaction fees and rewards is allocated to developer initiatives, ecosystem growth, and community engagement. This investment fosters innovation, supports long-term network health, and aligns incentives for ecosystem development.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute,

"Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

USDC

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	USDC	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	510300.01008	kWh/a
S.10 Renewable energy consumption	37.5028688348	%
S.11 Energy intensity	0.00001	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	178.42030	tCO2e
S.14 GHG intensity	0.00000	kgCO2e

Qualitative information

S.4 Consensus Mechanism

USDC is present on the following networks: Algorand, Aptos Coin, Arbitrum, Avalanche, Base, Celo, Ethereum, Flow, Hedera Hbar, Hyperliquid, Linea, Near Protocol, Optimism, Plume, Polygon, Ripple, Sei, Solana, Sonic, Statemint, Stellar, Sui, Tron, Xdc Network, Zksync.

The Algorand blockchain utilizes a consensus mechanism termed Pure Proof-of-Stake (PPoS). Consensus, in this context, describes the method by which blocks are selected and appended to the

blockchain. Algorand employs a verifiable random function (VRF) to select leaders who propose blocks for each round.

Upon block proposal, a pseudorandomly selected committee of voters is chosen to evaluate the proposal. If a supermajority of these votes are from honest participants, the block is certified. What makes this algorithm a Pure Proof of Stake is that users are chosen for committees based on the number of algos in their accounts. This system leverages random committee selection to maintain high performance and inclusivity within the network.

The consensus process involves three stages:

1. Propose: A leader proposes a new block.
2. Soft Vote: A committee of voters assesses the proposed block.
3. Certify Vote: Another committee certifies the block if it meets the required honesty threshold.

Aptos utilizes a Proof-of-Stake approach combined with a BFT consensus protocol to ensure high throughput, low latency, and secure transaction processing.

Core Components:

- Parallel Execution: Transactions are processed concurrently using Block-STM, a parallel execution engine, enabling high performance and scalability.
- Leader-Based BFT: A leader is selected among validators to propose blocks, while others validate and finalize transactions.
- Dynamic Validator Rotation: Validators are rotated regularly, enhancing decentralization and preventing collusion.
- Instant Finality: Transactions achieve finality once validated, ensuring that they are irreversible.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Celo uses a Proof of Stake (PoS) consensus model, which supports a decentralized, community-driven approach to governance and network security.

Core Components of Celo’s Consensus:

1. Proof of Stake (PoS):
   Validator Role: Validators are responsible for creating new blocks, validating transactions, and maintaining the security and integrity of the network. Validators are selected based on the amount of CELO tokens they hold and stake, incentivizing honest participation and network reliability.
2. Decentralized Governance:
   Community Voting: Governance on Celo is decentralized, allowing CELO token holders to vote on proposals and changes to the network. This community-driven approach ensures that token holders have a say in the network’s development and strategic direction.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Flow employs a Proof of Stake (PoS) model with a multi-role node architecture and the HotStuff Byzantine Fault Tolerant (BFT) protocol to achieve high throughput, scalability, and fast finality.

Core Components of Flow's Consensus:

1. Proof of Stake with Multi-Role Architecture:
   Specialized Node Roles: Flow's PoS model features a multi-node architecture where node roles are divided among different types of specialized nodes, each responsible for specific tasks. This separation enhances scalability by allowing nodes to focus on particular operations, leading to efficient transaction processing and high throughput.
2. HotStuff Consensus Algorithm:
   - Optimized for High Throughput and Fast Finality: Flow utilizes an optimized version of the HotStuff consensus protocol, which is designed to support high-speed, low-latency transactions essential for Flow's performance-oriented blockchain.
   - BFT Compliance: HotStuff is a BFT protocol, allowing it to tolerate up to one-third of nodes acting maliciously without compromising the network's security. This resilience ensures the network remains secure and functional, even with potential faults or dishonest nodes.
3. Leader-Based Block Proposal:
   - Leader and Replica Nodes: HotStuff operates with a leader-based approach where a designated leader node proposes new blocks, and other nodes (replicas) validate these blocks. This method simplifies the consensus process, reducing complexity and improving efficiency.
   - Leader Rotation Mechanism: To prevent centralization and enhance fault tolerance, HotStuff incorporates a leader rotation system, replacing the leader if it becomes unresponsive or acts maliciously. This rotation ensures continuous network reliability and minimizes downtime.

Hedera Hashgraph operates on a unique Hashgraph consensus algorithm, a directed acyclic graph (DAG) system that diverges from traditional blockchain technology. It uses Asynchronous Byzantine Fault Tolerance (aBFT) to secure the network.

Core Components:

1. Hashgraph Consensus and aBFT:
   Hedera Hashgraph's consensus mechanism achieves aBFT, which allows the network to tolerate malicious nodes without compromising security, ensuring high levels of fault tolerance and stability.
2. Gossip about Gossip Protocol:
   The network employs a "Gossip about Gossip" protocol, where nodes share transaction information along with details of previous gossip events. This process allows each node to rapidly learn the entire network state, enhancing communication efficiency and minimizing latency.
3. Virtual Voting:
   Hedera does not rely on traditional miners or stakers. Instead, it uses virtual voting, where nodes reach consensus by analyzing the gossip history and simulating votes based on the order and

frequency of transactions received. Virtual voting eliminates the need for actual voting messages, reducing network congestion and speeding up consensus.

4. Deterministic Finality:
   Once consensus is reached, transactions achieve deterministic finality instantly, making them irreversible and confirmed within seconds. This attribute is ideal for applications needing quick and irreversible transaction confirmations.
5. Staking for Network Security:
   Hedera incorporates staking to bolster network security. HBAR holders can stake their tokens to support validator nodes, contributing to the network's resilience and encouraging long-term engagement in consensus operations.

Hyperliquid is a decentralized perpetual exchange (DEX) built on its proprietary Layer 1 blockchain, Hyperliquid L1. At the core of its architecture is the HyperBFT consensus mechanism, inspired by the Hotstuff protocol, designed to meet the demands of high-frequency trading while maintaining security and consistency across the ecosystem.

The Linea Network uses a Zero-Knowledge Rollup (ZK-Rollup) architecture with a zkEVM for Ethereum compatibility, and its consensus is derived from Ethereum's own proof-of-stake security. While the Network has components like a sequencer for ordering transactions and a coordinator for network management, its consensus mechanism is fundamentally linked to the proof and verification process of zero-knowledge proofs and the security of the Ethereum mainnet. Instead of a typical decentralized consensus on a separate blockchain, the Network inherits its security and state finality from Ethereum.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

The Ripple blockchain, specifically the XRP Ledger (XRPL), uses a consensus mechanism known as the Ripple Protocol Consensus Algorithm (RPCA). It differs from Proof of Work (PoW) and Proof of Stake (PoS) as it doesn't rely on mining or staking but instead leverages trusted validators in a Federated Byzantine Agreement (FBA) model.

Core Concepts:

1. Validators and Unique Node Lists (UNL): Validators are trusted nodes in the network that validate transactions and propose new ledger updates. Each node maintains a list of trusted validators known as its Unique Node List (UNL). Consensus is achieved when 80% of the validators in a node's UNL agree on the validity of a transaction or block. This ensures high levels of security and decentralization.
2. Transaction Ordering and Validation: Transactions are broadcast to validators, and once 80% of the validators agree, the transaction is considered confirmed. Each ledger in the XRPL contains transaction data, and validators ensure the validity and proper ordering of these transactions.

Consensus Process:

1. Proposal Phase: Validators propose new transactions to be added to the ledger.
2. Validation Phase: Validators vote on proposed transactions by comparing them to their UNL. Consensus is achieved when 80% of validators agree.
3. Finalization: Once consensus is reached, the transactions are written into the new ledger, making them irreversible and final.

Sei leverages its Twin-Turbo consensus mechanism, integrating advanced transaction processing techniques with the reliability of Tendermint Core, to achieve high performance and security.

Core Components:

- Twin-Turbo Consensus:
  - Optimistic Block Processing: Validators process transactions optimistically, assuming their validity, reducing latency and increasing throughput.
  - Intelligent Block Propagation: Compressed block proposals containing transaction hashes enable validators to reconstruct blocks locally, expediting consensus.
  - Single Slot Finality: Ensures immediate block finality upon addition, eliminating the need for confirmations and minimizing the risk of chain reorganizations.
- Tendermint Core Integration:
  Incorporates Byzantine Fault Tolerance (BFT) to maintain security and resilience, safeguarding the network against malicious actors.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

Sonic utilizes a Proof-of-Stake (PoS) consensus mechanism integrated with a Directed Acyclic Graph (DAG) architecture to enhance scalability and efficiency. Validators are required to stake the network's native $S tokens, with a minimum of 500,000 $S tokens needed to operate a validator node. This substantial staking requirement ensures that validators have a significant investment in the network's integrity.

Statemint is a common-good parachain on the Polkadot and Kusama networks, designed to handle asset management and issuance efficiently while leveraging Polkadot's shared security model.

Core Components:

- Relay Chain Integration: Statemint inherits its consensus mechanism from the Polkadot Relay Chain, which operates on a Nominated Proof of Stake (NPoS) model. This model ensures robust security and decentralization by relying on validators and nominators.
- Shared Security: As a parachain, Statemint utilizes the Polkadot Relay Chain's validators for block validation, ensuring high security and interoperability without requiring independent validators.
- Collator Nodes: Statemint employs collator nodes to aggregate transactions into blocks and submit them to the Relay Chain validators for finalization. Collators do not participate in consensus directly but play a key role in transaction processing.
- Immediate Finality: The underlying Polkadot consensus mechanism ensures instant finality using the GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) protocol, which provides secure and efficient transaction confirmation.

Stellar uses a unique consensus mechanism known as the Stellar Consensus Protocol (SCP).

Core Concepts:

1. Federated Byzantine Agreement (FBA):
   - SCP is built on the principles of Federated Byzantine Agreement (FBA), which allows decentralized, leaderless consensus without the need for a closed system of trusted participants.
   - Quorum Slices: Each node in the network selects a set of other nodes (quorum slice) that it trusts. Consensus is achieved when these slices overlap and collectively agree on the transaction state.
2. Nodes and Validators:
   - Nodes: Nodes running the Stellar software participate in the network by validating transactions and maintaining the ledger.
   - Validators: Nodes that are responsible for validating transactions and reaching consensus on the state of the ledger. Consensus Process
3. Transaction Validation:
   Transactions are submitted to the network and nodes validate them based on predetermined rules, such as sufficient balances and valid signatures.
4. Nomination Phase:
   - Nomination: Nodes nominate values (proposed transactions) that they believe should be included in the next ledger. Nodes communicate their nominations to their quorum slices.
   - Agreement on Nominations: Nodes vote on the nominated values, and through a process of voting and federated agreement, a set of candidate values emerges. This phase continues until nodes agree on a single value or a set of values.
5. Ballot Protocol (Voting and Acceptance): Balloting:
   - The agreed-upon values from the nomination phase are then put into ballots. Each ballot goes through multiple rounds of voting, where nodes vote to either accept or reject the proposed values.
   - Federated Voting: Nodes exchange votes within their quorum slices, and if a value receives sufficient votes across overlapping slices, it moves to the next stage.
   - Acceptance and Confirmation: If a value gathers enough votes through multiple stages (prepare, confirm, externalize), it is accepted and externalized as the next state of the ledger.
6. Ledger Update:
   Once consensus is reached, the new transactions are recorded in the ledger. Nodes update their copies of the ledger to reflect the new state. Security and Economic Incentives

7. Trust and Quorum Slices:
   Nodes are free to choose their own quorum slices, which provides flexibility and decentralization. The overlapping nature of quorum slices ensures that the network can reach consensus even if some nodes are faulty or malicious.
8. Stability and Security:
   SCP ensures that the network can achieve consensus efficiently without relying on energy-intensive mining processes. This makes it environmentally friendly and suitable for high-throughput applications.
9. Incentive Mechanisms:
   Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, the network incentivizes participation through the intrinsic value of maintaining a secure, efficient, and reliable payment network.

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5.Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in

the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

XinFin Network operates on a modified Delegated Proof of Stake (XDPoS) model, XDPoS 2.0, which ensures scalability, security, and efficiency suitable for enterprise applications.

Core Components:

1. XDPoS 2.0 (Delegated Proof of Stake):
   Masternode System: Validators, known as masternodes, are required to stake XDC tokens to participate in transaction validation and block production. Validators are selected based on both stake size and community votes, ensuring only reliable nodes secure the network.
2. Double Validation Feature:
   - Enhanced Security: Each transaction is validated by two independent validators before it's finalized, reducing the risk of double-spending or malicious behavior and increasing network reliability.
   - Randomized Validator Rotation: Validators are selected in a rotating and randomized manner, preventing any single validator from consistently producing blocks, which enhances decentralization and security.

zkSync operates as a Layer 2 scaling solution for Ethereum, leveraging zero-knowledge rollups (ZK-Rollups) to enable fast, cost-effective, and secure transactions. This consensus mechanism allows zkSync to offload transaction computation from Ethereum's Layer 1, ensuring scalability while maintaining Ethereum's base-layer security.

Core Components:

- Zero-Knowledge Rollups (ZK-Rollups):
  zkSync aggregates multiple transactions off-chain and processes them in batches. A cryptographic proof, called a validity proof, is generated for each batch and submitted to the Ethereum mainnet. This ensures that all transactions are valid and compliant with Ethereum's rules without processing them individually on Layer 1.
- Validity Proofs:
  zkSync uses zk-SNARKs (Succinct Non-Interactive Arguments of Knowledge) for its validity proofs. These proofs provide mathematical guarantees that transactions within a batch are valid, eliminating the need for Ethereum nodes to re-execute off-chain transactions.
- Sequencers:
  Transactions on zkSync are ordered and processed by sequencers, which bundle transactions into batches. Sequencers maintain network efficiency and provide fast confirmations.

- Fraud Resistance:
  Unlike Optimistic Rollups, zkSync relies on validity proofs rather than fraud proofs, meaning that transactions are final and secure as soon as the validity proof is accepted by Ethereum.
- Data Availability:
  All transaction data is stored on-chain, ensuring that the network remains decentralized and users can reconstruct the state of zkSync at any time.

S.5 Incentive Mechanisms and Applicable Fees

USDC is present on the following networks: Algorand, Aptos Coin, Arbitrum, Avalanche, Base, Celo, Ethereum, Flow, Hedera Hbar, Hyperliquid, Linea, Near Protocol, Optimism, Plume, Polygon, Ripple, Sei, Solana, Sonic, Statemint, Stellar, Sui, Tron, Xdc Network, Zksync.

Algorand's consensus mechanism, Pure Proof-of-Stake (PPoS), relies on the participation of token holders (stakers) to ensure the network's security and integrity:

1. Participation Rewards:
   - Staking Rewards: Users who participate in the consensus protocol by staking their ALGO tokens earn rewards. These rewards are distributed periodically and are proportional to the amount of ALGO staked. This incentivizes users to hold and stake their tokens, contributing to network security and stability.
   - Node Participation Rewards: Validators, also known as participation nodes, are responsible for proposing and voting on blocks. These nodes receive additional rewards for their active role in maintaining the network.
2. Transaction Fees:
   - Flat Fee Model: Algorand employs a flat fee model for transactions, which ensures predictability and simplicity. The standard transaction fee on Algorand is very low (around 0.001 ALGO per transaction). These fees are paid by users to have their transactions processed and included in a block.
   - Fee Redistribution: Collected transaction fees are redistributed to participants in the network. This includes stakers and validators, further incentivizing their participation and ensuring continuous network operation.
3. Economic Security:
   Token Locking: To participate in the consensus mechanism, users must lock up their ALGO tokens. This economic stake acts as a security deposit that can be slashed (forfeited) if the participant acts maliciously. The potential loss of staked tokens discourages dishonest behavior and helps maintain network integrity.

Fees on the Algorand Blockchain

1. Transaction Fees:
   Algorand uses a flat transaction fee model. The current standard fee is 0.001 ALGO per transaction. This fee is minimal compared to other blockchain networks, ensuring affordability and accessibility.
2. Smart Contract Execution Fees:
   Fees for executing smart contracts on Algorand are also designed to be low. These fees are based on the computational resources required to execute the contract, ensuring that users are only charged for the actual resources they consume.
3. Asset Creation Fees:
   Creating new assets (tokens) on the Algorand blockchain involves a small fee. This fee is necessary to prevent spam and ensure that only genuine assets are created and maintained on the network.

Incentive Mechanism:

- Validator Rewards: Validators earn rewards in APT tokens for validating transactions and producing blocks. Rewards are distributed proportionally based on the stake of validators and their delegators.
- Delegator Participation: APT token holders can delegate their tokens to validators, earning a share of the staking rewards without running their own nodes.
- Slashing Mechanism: Validators face penalties, such as losing staked tokens, for malicious actions or prolonged inactivity, ensuring accountability and network security.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in APT tokens for sending transactions and interacting with smart contracts.
- Dynamic Fee Adjustment: Fees are dynamically adjusted based on network activity and resource usage, ensuring cost efficiency and preventing congestion.
- Fee Distribution: Transaction fees are distributed among validators and delegators, providing an additional incentive for network participation.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network’s inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Celo's incentive model rewards validators and prioritizes accessibility with minimal transaction fees, especially for cross-border payments, supporting a flexible and user-friendly ecosystem.

Incentive Mechanisms:

1. Validator Rewards:
   Transaction Fees and Newly Minted Tokens: Validators earn rewards from transaction fees as well as newly minted CELO tokens. This dual-source reward system provides a continuous financial incentive for validators to act honestly and secure the network.
2. Transaction Flexibility and Gas Price:
   - Gas Limit and Price Control: Each transaction specifies a maximum gas limit, ensuring that users are not excessively charged if a transaction fails. Users can also set a gas price to prioritize transactions, allowing faster processing for higher fees.
   - Payment Flexibility with Multiple Currencies: Unlike many blockchains, Celo allows transaction fees to be paid in various ERC-20 tokens, providing flexibility for users. This approach improves accessibility, especially for individuals with limited access to traditional banking.
3. Minimal Fee Structure for Accessibility:
   - Designed for Low-Cost Transactions: Celo's fee structure is intentionally minimal, particularly for cross-border payments, making it ideal for users who may not have traditional banking options. This focus on accessibility aligns with Celo's mission to bring blockchain technology to underserved communities.

Applicable Fees:

Transaction Fees: Fees are calculated based on gas usage, with a maximum gas limit set per transaction. This limit protects users from excessive costs, while the option to pay in multiple currencies enhances flexibility.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Flow's incentive model rewards validator nodes, supports ecosystem growth, and maintains affordable fees for developers and users.

Incentive Mechanisms:

1. Staking Rewards for Specialized Nodes:
   Role-Based Rewards: Validators earn Flow tokens according to their specific roles and contributions within the multi-node architecture, aligning rewards with each node's responsibilities to encourage balanced and effective network participation.
2. Transaction Fees:
   Stable and Consumer-Friendly Fees: Flow's fee structure is designed for predictability, keeping transaction costs stable for both developers and users. Fees are based on transaction complexity and provide an ongoing income stream for validators.
3. Misbehavior Penalties:
   Penalties for Downtime or Malicious Behavior: To maintain network stability, Flow imposes penalties on validators for misbehavior or downtime. This incentivizes high-quality validator participation and ensures consistent performance.
4. Ecosystem and Developer Support:
   Dedicated Portion of Fees and Rewards: A portion of Flow's transaction fees and rewards is allocated to developer initiatives, ecosystem growth, and community engagement. This investment fosters innovation, supports long-term network health, and aligns incentives for ecosystem development.

Hedera Hashgraph incentivizes network participation through transaction fees and staking rewards, with a structured and predictable fee model designed for enterprise use.

Incentive Mechanisms:

1. Staking Rewards for Nodes:
   - HBAR Rewards for Node Operators: Node operators earn HBAR rewards for providing network security and processing transactions, incentivizing them to act honestly and support network stability.
   - User Staking: HBAR holders can stake their tokens to support nodes. Staking rewards offer an additional incentive for token holders to engage in network operations, although the structure may evolve with network growth.
2. Service-Based Node Rewards:
   Nodes receive rewards based on specific services they provide to the network, such as:
   - Consensus Services: Reaching consensus and maintaining transaction order.
   - File Storage: Storing data on the Hedera network.
   - Smart Contract Processing: Supporting contract executions for decentralized applications.

Applicable Fees:

1. Predictable Transaction Fees: Hedera's fee structure is fixed and predictable, ensuring transparent costs for users and appealing to enterprise-grade applications. Transaction fees are paid in HBAR and are designed to be stable, making it easier for businesses to plan for usage costs.

2. Fee Allocation: All transaction fees collected in HBAR are distributed to network nodes as rewards, reinforcing their role in maintaining network integrity and processing transactions efficiently.

Hyperliquid incentivizes participants through its native token, HYPE. Validators and delegators earn rewards in HYPE for securing the network and participating in governance. Users can also earn HYPE by staking, providing liquidity, and engaging in other ecosystem activities. This dual-token system encourages active participation and supports the network's growth and stability.

Hyperliquid employs a dynamic fee model where transaction fees are based on network activity and the complexity of the transactions. These fees are paid by users conducting transactions on the network and are designed to cover the costs of processing transactions while incentivizing validators.

Like Ethereum, the Network uses a gas system, where gas is the unit of computational effort required to process a transaction. All gas fees on the Network are paid in Ether (ETH). The Network has a base fee that is designed to stabilize at 7 wei. The base fee still decreases or increases based on network traffic, similar to Ethereum, but it does not go below 7 wei. The Network does not require token staking for transaction validation purposes and thus provides no staking rewards. It does not offer incentives for running a full network node. It does charge fees collected by the sequencer for transaction processing. Those fees are paid in ETH, 20% of which are immediately burned while the remaining 80% are converted to Tokens and then burned.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.
3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees

associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

The Ripple XRP blockchain uses a unique incentive structure that differs from traditional Proof of Work (PoW) or Proof of Stake (PoS) systems, focusing on its Ripple Protocol Consensus Algorithm (RPCA).

Incentive Mechanisms to Secure Transactions:

1. Validators: Validators on the Ripple network are not directly compensated with rewards like in PoW/PoS models. Instead, they are incentivized by the utility and stability of the network, particularly financial institutions that benefit from Ripple's efficiency in cross-border payments.
2. No Mining: Since Ripple does not use mining, it eliminates the need for energy-intensive computations, contributing to fast transaction speeds and scalability.

Fees on the Ripple XRP Blockchain:

1. Transaction Fees: Ripple charges minimal transaction fees (typically fractions of an XRP, known as \drops") for each transaction. The purpose of these fees is to prevent network spam and overload.
2. Burn Mechanism: A portion of each transaction fee is burned, meaning it's permanently removed from circulation. This reduces the overall supply of XRP over time, contributing to potential long-term value stability.

The Sei Network incentivizes participation through staking rewards and a transparent fee structure, supporting its decentralized ecosystem.

Incentive Mechanisms:

- Staking Rewards: Validators and delegators earn SEI tokens as rewards for securing the network through staking, promoting active engagement and long-term commitment.
- Governance Participation: SEI token holders can participate in network governance decisions, influencing protocol upgrades and key changes.

Applicable Fees:

Transaction Fees: Users pay fees in SEI tokens for network transactions. These fees are distributed to validators and delegators as rewards, supporting network operations and security.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators.

This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Sonic's economic model is designed to incentivize active participation from both validators and developers. Validators earn rewards through a combination of block rewards and transaction fees. The block reward system employs a dynamic Annual Percentage Rate (APR) mechanism.

Statemint is a common-good parachain on the Polkadot and Kusama networks, designed to enable efficient asset management while benefiting from Polkadot’s shared security and governance model.

Incentive Mechanisms:

- Relay Chain Validators: Validators securing the Polkadot Relay Chain are indirectly incentivized through block rewards and transaction fees collected across all parachains, including Statemint. This ensures the stability and security of the network without requiring Statemint-specific rewards.
- Collator Compensation: Collator nodes aggregate transactions and produce blocks for Statemint. They may be compensated through external arrangements, such as subsidies or user-driven incentives, depending on governance decisions and usage patterns.
- Governance Participation: Polkadot (DOT) and Kusama (KSM) token holders influence Statemint’s operations, such as fee adjustments and protocol upgrades, through on-chain governance mechanisms.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in the native tokens of the Relay Chain, DOT for Polkadot or KSM for Kusama. These fees are distributed to Relay Chain validators to support the network's maintenance.
- Asset Creation and Transfer Fees: Fees apply for creating new assets and transferring them on the Statemint chain. These fees help prevent spam and ensure efficient use of network resources.
- Governance-Defined Fee Adjustments: The Statemint parachain's fees can be adjusted through governance proposals, enabling the community to adapt costs to network conditions.

Stellar's consensus mechanism, the Stellar Consensus Protocol (SCP), is designed to achieve decentralized and secure transaction validation through a federated Byzantine agreement (FBA) model. Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, it ensures network security and transaction validation through intrinsic network mechanisms and transaction fees.

Incentive Mechanisms:

1. Quorum Slices and Trust:
   - Quorum Slices: Each node in the Stellar network selects other nodes it trusts to form a quorum slice. Consensus is achieved through the intersection of these slices, creating a robust and decentralized trust network.
   - Federated Voting: Nodes communicate their votes within their quorum slices, and through multiple rounds of federated voting, they agree on the transaction state. This process ensures that even if some nodes are compromised, the network can still achieve consensus securely.
2. Intrinsic Value and Participation:
   - Network Value: The intrinsic value of participating in a secure, efficient, and reliable payment network incentivizes nodes to act honestly and maintain network security. Organizations and individuals running nodes benefit from the network's functionality and the ability to facilitate transactions.
   - Decentralization: By allowing nodes to choose their own quorum slices, Stellar promotes decentralization, reducing the risk of central points of failure and making the network more resilient to attacks. Fees on the Stellar Blockchain
3. Transaction Fees:
   - Flat Fee Structure: Each transaction on the Stellar network incurs a flat fee of 0.00001 XLM (known as a base fee). This low and predictable fee structure makes Stellar suitable for micropayments and high-volume transactions.
   - Spam Prevention: The transaction fee serves as a deterrent against spam attacks. By requiring a small fee for each transaction, Stellar ensures that the network remains efficient and that resources are not wasted on processing malicious or frivolous transactions.
4. Operational Costs:
   Minimal Fees: The minimal transaction fees on Stellar not only prevent spam but also cover the operational costs of running the network. This ensures that the network can sustain itself without placing a significant financial burden on users.
5. Reserve Requirements:
   - Account Reserves: To create a new account on the Stellar network, a minimum balance of 1 XLM is required. This reserve requirement prevents the creation of an excessive number of accounts, further protecting the network from spam and ensuring efficient resource usage.
   - Trustline and Offer Reserves: Additional reserve requirements exist for creating trustlines and offers on the Stellar decentralized exchange (DEX). These reserves help maintain network integrity and prevent abuse.

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

XinFin incentivizes both validators and token holders to actively participate in network security and stability through staking and fee distribution mechanisms.

Incentive Mechanisms:

1. Staking Rewards:
   - Validator Rewards: Validators earn XDC token rewards for validating transactions and maintaining network security.
   - Delegator Rewards: XDC holders who delegate their tokens to validators receive a share of staking rewards, promoting community participation without requiring users to operate nodes.
2. Delegation Model:
   Passive Income: XDC holders can delegate tokens to validators, enabling them to earn rewards passively and boosting network security through broader staking participation.

Applicable Fees:

- Fee Distribution: All transactions incur XDC fees, which are distributed to validators as additional rewards for their role in securing the network.
- Predictable Fees for Enterprises: Transaction fees are kept low and predictable, supporting XinFin's focus on enterprise use cases in finance, trade, and cross-border payments.

zkSync incentivizes network participants through a streamlined fee structure and role-based rewards, designed to ensure security, scalability, and usability for both users and validators.

Incentive Mechanism:

- Validator Rewards: Validators, who generate validity proofs and secure the network, are compensated through transaction fees paid by users. Their role ensures that batches of transactions are processed efficiently and accurately.
- Sequencer Incentives: Sequencers are responsible for bundling and ordering transactions off-chain. They earn a share of the transaction fees for maintaining network performance and fast processing times.
- Ecosystem Growth Rewards: zkSync allocates resources to incentivize developers and projects building on its platform, fostering a robust ecosystem of dApps, DeFi protocols, and NFT marketplaces.

Applicable Fees:

- Transaction Fees: Users pay fees in Ether (ETH) for transactions on zkSync. These fees are significantly lower than Ethereum Layer 1 fees, as zkSync processes transactions off-chain and submits only aggregated proofs to the Ethereum mainnet.
- Fee Model: Fees are dynamically calculated based on the complexity of transactions (e.g., token transfers, smart contract interactions) and the cost of submitting validity proofs to Ethereum.
- Scalability Benefits: zkSync's efficient rollup architecture reduces gas fees for users while ensuring that validators and sequencers are appropriately compensated for their roles.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) algorand, aptos_coin, arbitrum, avalanche, base, celo, ethereum, flow, hedera_hbar, hyperliquid, linea, near_protocol, optimism, plume, polygon, ripple, sei, solana, sonic, statemint, stellar, sui, tron, xdc_network, zksync is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity generation - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Kusama

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Kusama	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	474616.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Kusama is a scalable, interoperable blockchain platform built using a Nominated Proof of Stake (NPoS) consensus mechanism. It is a canary network for Polkadot, allowing developers to experiment and deploy new features before they are added to Polkadot. Kusama’s NPoS mechanism ensures high security, decentralized control, and rapid block finality.

Key Features of Kusama’s Consensus Mechanism:

1. Nominated Proof of Stake (NPoS):
   - Validators and Nominators: Kusama's consensus mechanism relies on validators and nominators. Validators are responsible for producing blocks and validating transactions, while nominators select trustworthy validators by staking KSM (Kusama’s native token).
   - Staking and Security: Validators must stake KSM tokens to participate in consensus, and nominators back validators with their KSM tokens. The more KSM tokens staked by both validators and nominators, the more secure the network is.
   - Validator Rotation: Validators are selected based on the amount of KSM staked, with a fixed number of validators chosen to participate in consensus at any given time. The network periodically rotates validators to ensure fairness and prevent centralization.
   - Finality and Security: NPoS ensures secure and fast finality. Once a block is validated, it becomes part of the immutable blockchain, meaning it cannot be reverted or reorganized.
2. Governance:
   - On-Chain Governance: Kusama features a robust on-chain governance system that allows KSM holders to vote on important protocol decisions, including changes to the consensus mechanism, network upgrades, and other governance parameters.

- Democratic Decision-Making: All token holders have voting power proportional to the amount of KSM they hold and are willing to lock up. This ensures decentralized control over network upgrades and parameters.
- Governance Proposals: Kusama's governance is open and transparent, with proposals submitted by the community, allowing participants to shape the direction of the network.

3. Parachain Auctions:
   - Shared Security: Kusama supports parachains, which are individual blockchains that benefit from Kusama's shared security model. Parachain slots are won through auctions where participants bid with KSM tokens, ensuring that only the most committed participants secure a parachain slot.
   - Scalability: This multi-chain model enables Kusama to scale horizontally, allowing for the connection of numerous independent blockchains, which can interoperate within the Kusama ecosystem.
4. Fast Finality and High Throughput:
   - Speed: Kusama's consensus mechanism allows for rapid block finality and high throughput, supporting thousands of transactions per second.
   - Low Latency: The system's low-latency design ensures quick confirmation times, enabling Kusama to handle high transaction volumes efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Kusama's incentive mechanisms ensure active participation in securing and maintaining the network while its fee structure supports efficient operation and scalability of the ecosystem.

Incentive Mechanism:

1. Validator Rewards:
   - Block Rewards: Validators in Kusama earn rewards for successfully producing blocks and validating transactions. These rewards are given in KSM tokens and are distributed proportionally to the amount of KSM staked by validators and nominators.
   - Transaction Fees: In addition to block rewards, validators also earn transaction fees for validating and including transactions in blocks. These fees are paid by users who want their transactions included in the next block.
2. Nominator Rewards:
   - Staking Rewards: Nominators, who delegate their KSM tokens to trusted validators, share in the rewards earned by the validators they support. Nominators receive a proportion of both the block rewards and transaction fees, incentivizing them to choose high-performing validators.
   - Reward Distribution: The rewards earned by nominators are distributed based on the amount of KSM they have staked with a validator. More KSM staked means higher rewards for the nominator.
3. Parachain Auction Participation:
   - Slot Auctions: Kusama's parachain slots are won through an auction process, where participants bid using KSM tokens. This incentivizes KSM holders to lock up their tokens in parachain auctions to secure valuable parachain slots for their projects.
   - Crowdloan Incentives: Projects bidding for parachain slots can incentivize users to participate in crowdloans, where users lend their KSM tokens to the project in exchange for potential rewards once the project secures a parachain slot.
4. Governance Participation:

   Voting Rewards: KSM token holders who participate in governance decisions, such as voting on proposals and upgrades, are incentivized with the ability to influence the future of the network. Although there are no direct financial rewards for voting, active participation in governance ensures the sustainability and growth of the ecosystem.

Applicable Fees:

1. Transaction Fees:
   - Fee Structure: Kusama users pay transaction fees for processing their transactions on the network. These fees are generally low and are determined by the transaction's size and network demand. Transaction fees are paid in KSM tokens and are used to compensate validators for their work.
   - Dynamic Fee Adjustment: The fee rate can adjust based on the current network congestion. During periods of high demand, transaction fees can increase, prioritizing faster processing of transactions with higher fees.
2. Parachain Slot Auction Fees:
   Bidding Fees: Projects wishing to secure a parachain slot must participate in an auction and bid KSM tokens to win the slot. The auction fees paid to win a parachain slot are burned or redistributed within the Kusama ecosystem to support network growth and maintenance.
3. Storage Fees:
   Data Storage: Kusama charges fees for storing data on the network, including smart contracts and parachain data. These fees are required to ensure efficient data usage and prevent unnecessary resource consumption. Fees for storage are also paid in KSM tokens.
4. Governance Fees:
   Proposal and Voting Costs: Participants in governance, such as those submitting proposals or voting on network upgrades, may be required to pay minimal fees, ensuring the governance process is secure and spam-free. These costs help prevent abuse of the voting system and are intended to maintain an orderly governance environment.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Ripple XRP

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ripple XRP	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	456288.08460	kWh/a

Qualitative information

S.4 Consensus Mechanism

Ripple XRP is present on the following networks: Binance Smart Chain, Klaytn, Ripple.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators

and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Klaytn employs a modified Istanbul Byzantine Fault Tolerance (IBFT) consensus algorithm, a variant of Proof of Authority (PoA), enabling high performance and immediate transaction finality.

Core Components of Klaytn's Consensus:

1. Modified IBFT Algorithm:
   Immediate Transaction Finality: Klaytn's IBFT algorithm ensures that once a block is validated, it is immediately final and cannot be reversed. This guarantees that transactions are quickly settled, providing a secure and efficient user experience.
2. Klaytn Governance Council:
   - Council-Driven Governance: The Klaytn network is governed by the Klaytn Governance Council, a consortium of global organizations responsible for selecting and maintaining Consensus Nodes (CNs). This council-based governance model balances decentralization with performance and ensures transparency in decision-making.
   - Two-Thirds Majority for Finalization: For a block to be finalized, it must receive signatures from more than two-thirds of the council members, ensuring broad consensus and network security.
3. Three-Tiered Node Architecture:
   - Consensus Nodes (CNs): The selected validators responsible for producing and validating blocks. CNs are at the core of the network's security and stability.
   - Proxy Nodes (PNs): Act as intermediaries, relaying data between CNs and the broader network, which helps distribute network traffic and improve accessibility.
   - Endpoint Nodes (ENs): Interface directly with end-users, facilitating transactions, executing smart contracts, and serving as user access points to the Klaytn network.

The Ripple blockchain, specifically the XRP Ledger (XRPL), uses a consensus mechanism known as the Ripple Protocol Consensus Algorithm (RPCA). It differs from Proof of Work (PoW) and Proof of Stake (PoS) as it doesn't rely on mining or staking but instead leverages trusted validators in a Federated Byzantine Agreement (FBA) model.

Core Concepts:

1. Validators and Unique Node Lists (UNL): Validators are trusted nodes in the network that validate transactions and propose new ledger updates. Each node maintains a list of trusted validators known as its Unique Node List (UNL). Consensus is achieved when 80% of the validators in a node's UNL agree on the validity of a transaction or block. This ensures high levels of security and decentralization.
2. Transaction Ordering and Validation: Transactions are broadcast to validators, and once 80% of the validators agree, the transaction is considered confirmed. Each ledger in the XRPL contains transaction data, and validators ensure the validity and proper ordering of these transactions.

Consensus Process:

1. Proposal Phase: Validators propose new transactions to be added to the ledger.
2. Validation Phase: Validators vote on proposed transactions by comparing them to their UNL. Consensus is achieved when 80% of validators agree.
3. Finalization: Once consensus is reached, the transactions are written into the new ledger, making them irreversible and final.

S.5 Incentive Mechanisms and Applicable Fees

Ripple XRP is present on the following networks: Binance Smart Chain, Klaytn, Ripple.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Klaytn's incentive structure includes block rewards and transaction fees distributed to Consensus Nodes (CNs) and various network funds, fostering network security, sustainability, and community development.

Incentive Mechanisms:

1. Rewards for Consensus Nodes (CNs):
   - Fixed Block Rewards: CNs earn fixed rewards in KLAY tokens for validating and producing blocks. This predictable income incentivizes CNs to maintain active participation and secure the network.
   - Transaction Fees: Users pay transaction fees in KLAY tokens, which are collected by the network and distributed among the CNs as additional rewards, further supporting network security and stability.
2. Block Reward Distribution: Governance Council (GC) Reward:
   - GC Block Proposer Reward: 10% of the block reward goes to the specific CN that proposed the block, incentivizing continuous active participation.
   - GC Staking Award: 40% of the block reward is distributed among all Governance Council members who stake KLAY, promoting network security by rewarding staked tokens.
   - Klaytn Community Fund (KCF): 30% of each block reward is allocated to the KCF to support community development, dApp creation, and overall ecosystem growth.
   - Klaytn Foundation Fund (KFF): 20% of the block reward goes to the KFF, providing resources for long-term network sustainability and future development initiatives.
3. Transaction Fees:
   - User Fees for Network Interaction: Users pay fees in KLAY based on gas usage and gas price for transactions. These fees are then distributed to CNs, incentivizing efficient transaction processing and active participation.

Applicable Fees:

Transaction Fees: Transaction fees on Klaytn are paid in KLAY and calculated based on gas consumption. These fees support network maintenance by compensating validators and fostering economic sustainability.

The Ripple XRP blockchain uses a unique incentive structure that differs from traditional Proof of Work (PoW) or Proof of Stake (PoS) systems, focusing on its Ripple Protocol Consensus Algorithm (RPCA).

Incentive Mechanisms to Secure Transactions:

1. Validators: Validators on the Ripple network are not directly compensated with rewards like in PoW/PoS models. Instead, they are incentivized by the utility and stability of the network, particularly financial institutions that benefit from Ripple's efficiency in cross-border payments.
2. No Mining: Since Ripple does not use mining, it eliminates the need for energy-intensive computations, contributing to fast transaction speeds and scalability.

Fees on the Ripple XRP Blockchain:

1. Transaction Fees: Ripple charges minimal transaction fees (typically fractions of an XRP, known as \drops") for each transaction. The purpose of these fees is to prevent network spam and overload.
2. Burn Mechanism: A portion of each transaction fee is burned, meaning it's permanently removed from circulation. This reduces the overall supply of XRP over time, contributing to potential long-term value stability.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, klaytn is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Arweave ⓐ

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Arweave	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	437562.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Arweave is present on the following networks: Arweave, Ethereum.

Arweave employs a unique Proof of Access (PoA) consensus mechanism, which integrates a requirement for miners to provide cryptographic proof of access to historical data, known as a "recall block." This ensures that miners contribute to both data storage and network security by storing and verifying historical data.

Core Components:

1. Proof of Access (PoA):
   - Recall Block Verification: During mining, miners must retrieve and validate a randomly selected "recall block" from Arweave's data history, proving they retain access to stored data. This process secures the network while emphasizing long-term data availability.
   - Enhanced Proof of Work (PoW): PoA builds upon traditional PoW by requiring miners to demonstrate access to previously stored data, adding a storage-focused layer to network security and incentivizing distributed data retention.
2. Data-Centric Mining Incentives:
   Distributed Storage: The PoA design encourages miners to store a broad history of blocks, as possessing more recall blocks enhances their probability of successfully mining new blocks and earning rewards.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Arweave is present on the following networks: Arweave, Ethereum.

Arweave's economic model incentivizes miners to contribute to data storage through upfront storage fees and ongoing block rewards, supporting the network's mission of providing permanent and accessible data storage.

Incentive Mechanisms:

1. One-Time Storage Fees:
   Permanent Data Storage: Users pay a one-time, upfront fee in AR tokens, calculated based on data size and projected storage costs. This fee funds indefinite data storage on the network. Endowment Pool: A portion of each storage fee is allocated to an endowment pool, covering future storage costs as technology advances, ensuring sustainable, permanent data storage.

2. Mining Rewards:
   Block Rewards: Miners earn AR tokens for successfully mining blocks, incentivizing them to store historical data and maintain network integrity.

Applicable Fees: Storage fees in AR are set by data size and projected long-term costs, covering the initial and future costs of data permanence.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Algorand



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Algorand	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	420961.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Algorand blockchain utilizes a consensus mechanism termed Pure Proof-of-Stake (PPoS). Consensus, in this context, describes the method by which blocks are selected and appended to the blockchain. Algorand employs a verifiable random function (VRF) to select leaders who propose blocks for each round.

Upon block proposal, a pseudorandomly selected committee of voters is chosen to evaluate the proposal. If a supermajority of these votes are from honest participants, the block is certified. What makes this algorithm a Pure Proof of Stake is that users are chosen for committees based on the number of algos in their accounts. This system leverages random committee selection to maintain high performance and inclusivity within the network.

The consensus process involves three stages:

1. Propose: A leader proposes a new block.
2. Soft Vote: A committee of voters assesses the proposed block.
3. Certify Vote: Another committee certifies the block if it meets the required honesty threshold.

S.5 Incentive Mechanisms and Applicable Fees

Algorand's consensus mechanism, Pure Proof-of-Stake (PPoS), relies on the participation of token holders (stakers) to ensure the network's security and integrity:

1. Participation Rewards:
   - Staking Rewards: Users who participate in the consensus protocol by staking their ALGO tokens earn rewards. These rewards are distributed periodically and are proportional to the amount of ALGO staked. This incentivizes users to hold and stake their tokens, contributing to network security and stability.
   - Node Participation Rewards: Validators, also known as participation nodes, are responsible for proposing and voting on blocks. These nodes receive additional rewards for their active role in maintaining the network.
2. Transaction Fees:
   - Flat Fee Model: Algorand employs a flat fee model for transactions, which ensures predictability and simplicity. The standard transaction fee on Algorand is very low (around 0.001 ALGO per

transaction). These fees are paid by users to have their transactions processed and included in a block.
- Fee Redistribution: Collected transaction fees are redistributed to participants in the network. This includes stakers and validators, further incentivizing their participation and ensuring continuous network operation.

3. Economic Security:
Token Locking: To participate in the consensus mechanism, users must lock up their ALGO tokens. This economic stake acts as a security deposit that can be slashed (forfeited) if the participant acts maliciously. The potential loss of staked tokens discourages dishonest behavior and helps maintain network integrity.

Fees on the Algorand Blockchain

1. Transaction Fees:
Algorand uses a flat transaction fee model. The current standard fee is 0.001 ALGO per transaction. This fee is minimal compared to other blockchain networks, ensuring affordability and accessibility.
2. Smart Contract Execution Fees:
Fees for executing smart contracts on Algorand are also designed to be low. These fees are based on the computational resources required to execute the contract, ensuring that users are only charged for the actual resources they consume.
3. Asset Creation Fees:
Creating new assets (tokens) on the Algorand blockchain involves a small fee. This fee is necessary to prevent spam and ensure that only genuine assets are created and maintained on the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Sui

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/

Field	Value	Unit
S.3 Name of the crypto-asset	Sui	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	394725.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5.Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make

assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

EOS

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	EOS	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	344268.33894	kWh/a

Qualitative information

S.4 Consensus Mechanism

EOS is present on the following networks: Binance Smart Chain, Eos, Eos Evm.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The EOS blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to provide high transaction throughput and low latency.

Core Components of EOS Consensus:

- Delegated Proof of Stake (DPoS) with Block Producers (BPs) Voting for Block Producers: EOS token holders vote to select 21 block producers (BPs) who validate transactions and produce blocks. This voting process is continuous, with token holders able to reallocate their votes at any time, ensuring the active block producers are consistently those with the most community support.
- Active Rotation: The top 21 BPs are rotated regularly to maintain a decentralized and representative set of validators, helping secure the network while giving all selected BPs equal opportunities for block production. Byzantine Fault Tolerance (BFT) in DPoS EOS incorporates BFT principles within its DPoS consensus to finalize blocks with a high degree of security. Transactions gain irreversibility once approved by a majority of block producers, providing faster finality and reducing the risk of forks or double-spending attacks.
- High Throughput and Block Production Block Time: EOS block producers create blocks in 0.5-second intervals, facilitating a rapid transaction processing rate. If a block producer misses their turn, the system immediately switches to the next producer, keeping network latency minimal.

EOS EVM operates within the EOS blockchain, which utilizes a Delegated Proof of Stake (DPoS) consensus mechanism. In this system, EOS token holders vote to elect a set number of block producers responsible for validating transactions and adding new blocks to the blockchain. The EOS EVM functions as a smart contract on the EOS network, enabling Ethereum-compatible smart contracts to run within this DPoS framework.

S.5 Incentive Mechanisms and Applicable Fees

EOS is present on the following networks: Binance Smart Chain, Eos, Eos Evm.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

EOS incentivizes block producers to maintain the network and operates with unique staking and resource models to control transaction costs.

Incentive Mechanisms:

Block Producer Rewards Earning EOS Tokens: Block producers are rewarded in EOS tokens for validating transactions and producing blocks, providing the primary economic incentive for maintaining network operations and security. Voting Rewards for BPs Although not part of the core protocol, block producers often offer incentives to encourage token holders to vote for them. This encourages accountability, transparency, and performance, as EOS holders tend to favor reliable and engaged BPs.

Applicable Fees and Resource Model:

- Fee-less Transactions for Users Resource Staking (CPU, NET): Rather than charging direct transaction fees, EOS allows users to perform fee-less transactions by staking EOS tokens for network resources like CPU and NET bandwidth, which are required for transaction processing.
- RAM for Storage: dApp developers purchase RAM for data storage on the EOS network. RAM prices are determined through a market-based system, where supply and demand influence cost.
- EOS EVM Gas Fees Dynamic Gas Model: For transactions on the EOS EVM, gas fees are dynamically calculated, based on transaction demand, similar to Ethereum’s gas model. These fees, paid in EOS tokens, enable Ethereum-compatible smart contracts to run on EOS, offering a familiar environment for EVM developers and users. EOS EVM Integration With EOS EVM, users and developers benefit from a familiar gas fee structure, allowing Ethereum-based applications to operate seamlessly on the EOS network while maintaining competitive costs.

Within the EOS EVM environment, users pay gas fees denominated in EOS tokens for executing smart contracts and transactions. These fees are designed to mirror Ethereum's gas model to maintain compatibility with Ethereum-based tools and applications. The collected fees are distributed to EOS block producers as compensation for their role in validating transactions and maintaining the network's integrity. This fee structure ensures that the execution of Ethereum-compatible smart contracts on EOS is both efficient and economically sustainable.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

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energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Merlin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Merlin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	307362.79287	kWh/a

Qualitative information

S.4 Consensus Mechanism

Merlin Chain employs a Zero-Knowledge Rollup (ZK-Rollup) architecture and additional mechanisms to ensure efficient, secure, and decentralized transaction processing; transactions are aggregated off-chain into a single cryptographic proof before submission to the Bitcoin mainnet, enhancing scalability and reducing costs while leveraging Bitcoin's security; a Data Availability Committee (DAC) manages off-chain data validity and accessibility, ensuring integrity and transparency in the ZK-Rollup process; a two-step Zero-Knowledge Proof submission mechanism allows miners to participate in proof generation and submission, decentralizing the security model and creating a stable computational environment.

S.5 Incentive Mechanisms and Applicable Fees

Merlin Chain's incentive model ensures fair compensation for validators and a transparent fee structure for users; validators earn rewards from transaction fees for securing the network and processing transactions on both Layer 2 (L2) and Layer 1 (L1); L2 fees cover the cost of executing transactions on Merlin Chain's Layer 2 network, while L1 security fees cover the cost of transmitting aggregated transaction data and ZK proofs to the Bitcoin mainnet for finalization; the gas fee model, similar to EVM-compatible chains, determines fees based on network usage and computational requirements, ensuring predictable and efficient fee allocation.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, bitcoin, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Tezos

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Tezos	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	282247.45389	kWh/a

Qualitative information

S.4 Consensus Mechanism

Tezos is present on the following networks: Binance Smart Chain, Tezos.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Tezos operates on a Liquid Proof of Stake (LPoS) consensus mechanism, which combines flexibility in staking participation with an on-chain governance model.

Core Components:

Liquid Proof of Stake (LPoS) Tezos allows token holders to participate in staking by either directly staking their tokens or delegating them to a validator (known as a baker) without transferring ownership. Validators (bakers) are responsible for creating new blocks (baking) and endorsing other blocks for validation. Bakers and Endorsers Bakers are selected based on the amount of XTZ (Tezos tokens) staked or delegated to them. The more XTZ staked, the higher the probability of being chosen to bake or endorse blocks. Endorsers are randomly selected from a pool of bakers to validate and approve blocks baked by other bakers. This additional validation enhances network security. Self-Amendment and Governance Tezos's unique governance model allows token holders to propose, vote on, and implement network upgrades without requiring hard forks. This self-amendment protocol enables Tezos to evolve based on community and developer input, making it highly adaptable and flexible.

S.5 Incentive Mechanisms and Applicable Fees

Tezos is present on the following networks: Binance Smart Chain, Tezos.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Tezos incentivizes network participation and security through baking rewards, transaction fees, and an inflationary reward model.

Incentive Mechanisms:

Rewards for Baking and Endorsing Bakers receive XTZ rewards for baking new blocks. Endorsers, who validate and approve blocks baked by others, are also rewarded in XTZ. These rewards encourage active participation and help secure the network. Delegation Incentives XTZ holders who do not wish to bake can delegate their tokens to a baker, earning a share of the baker's rewards without directly participating. This delegation option broadens participation, making it accessible to more users, thereby enhancing overall network security. Security Deposit Requirement Bakers are required to post a bond (security deposit) in XTZ to bake blocks, which is held as collateral to prevent dishonest actions. If a baker acts maliciously, they risk forfeiting this bond, creating a disincentive for bad behavior and aligning bakers' interests with network integrity.

Applicable Fees:

Transaction Fees Users pay transaction fees in XTZ for activities such as transferring funds and interacting with smart contracts. These fees are awarded to bakers and endorsers, providing them with an additional incentive to validate and secure the network. Inflationary Reward Model Tezos has an inflationary reward system, where new XTZ tokens are periodically created and distributed as rewards to bakers and endorsers. This model encourages continuous participation but gradually increases the XTZ supply, balancing network security and token availability over time.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital

Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

The following sources where used: tzStats

Wallet Connect

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Wallet Connect	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	269238.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

WalletConnect Network does not utilize a traditional blockchain consensus mechanism such as Proof of Work (PoW) or Proof of Stake (PoS). Instead, it operates as a decentralized communication protocol that facilitates secure connections between decentralized applications (dApps) and cryptocurrency wallets across various blockchain ecosystems. The network employs end-to-end encryption to ensure the confidentiality and integrity of the data exchanged between parties. This design allows users to interact seamlessly with dApps using their preferred wallets without relying on a centralized intermediary.

S.5 Incentive Mechanisms and Applicable Fees

The WalletConnect Network uses the WalletConnect Token (WCT) to support participation and decentralization. While initially fee-free, the network may introduce usage fees over time through governance decisions. Node operators and participants are rewarded in WCT based on performance, such as uptime and reliability. WCT can also be staked, allowing holders to earn rewards and take part in protocol governance. This model aims to ensure long-term sustainability and align the interests of infrastructure providers, wallets, and users.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Saga

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Saga	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	262800.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Saga is a Layer-1 protocol built on the Cosmos SDK, utilizing a Proof of Stake (PoS) consensus mechanism facilitated by the CometBFT (formerly Tendermint) consensus engine. Validators are selected based on the amount of SAGA tokens staked, with the top validators by voting power becoming active participants in the consensus process.

These validators commit new blocks to the blockchain by broadcasting votes with cryptographic signatures, ensuring the network's security and transaction finality.

S.5 Incentive Mechanisms and Applicable Fees

In the Saga ecosystem, developers can deploy dedicated blockchains, known as Chainlets, with ease. End-users pay transaction fees to Chainlet developers, who in turn pay gas fees to the Saga mainnet. This structure grants developers flexibility in determining how end-user transaction fees are utilized. Gas fees can be paid with SAGA tokens or other tokens such as ETH or USDC, providing adaptability in fee management.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, cosmos, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Aptos Coin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Aptos Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	262800.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Aptos utilizes a Proof-of-Stake approach combined with a BFT consensus protocol to ensure high throughput, low latency, and secure transaction processing.

Core Components:

- Parallel Execution: Transactions are processed concurrently using Block-STM, a parallel execution engine, enabling high performance and scalability.
- Leader-Based BFT: A leader is selected among validators to propose blocks, while others validate and finalize transactions.
- Dynamic Validator Rotation: Validators are rotated regularly, enhancing decentralization and preventing collusion.
- Instant Finality: Transactions achieve finality once validated, ensuring that they are irreversible.

S.5 Incentive Mechanisms and Applicable Fees

Incentive Mechanism:

- Validator Rewards: Validators earn rewards in APT tokens for validating transactions and producing blocks. Rewards are distributed proportionally based on the stake of validators and their delegators.
- Delegator Participation: APT token holders can delegate their tokens to validators, earning a share of the staking rewards without running their own nodes.
- Slashing Mechanism: Validators face penalties, such as losing staked tokens, for malicious actions or prolonged inactivity, ensuring accountability and network security.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in APT tokens for sending transactions and interacting with smart contracts.
- Dynamic Fee Adjustment: Fees are dynamically adjusted based on network activity and resource usage, ensuring cost efficiency and preventing congestion.
- Fee Distribution: Transaction fees are distributed among validators and delegators, providing an additional incentive for network participation.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are

assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) aptos_coin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Berachain BERA

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Berachain BERA	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	244404.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Berachain utilizes a unique consensus mechanism called Proof-of-Liquidity (PoL). In this system, validators secure the network by staking the native gas token, $BERA. The likelihood of a validator being selected to propose a block is proportional to the amount of $BERA they have staked. Upon successfully proposing a block, validators receive rewards in the form of $BGT (Bera Governance Token). The amount of $BGT awarded is influenced by the level of $BGT delegation they have received from other participants. This mechanism aligns the incentives of validators, protocols, and users, contributing to the overall long-term health of the chain.

S.5 Incentive Mechanisms and Applicable Fees

In Berachain's economic model, validators and delegators are incentivized through a combination of staking rewards and protocol-provided incentives. Validators earn $BGT rewards for block production, with the reward size determined by their boost, which is a percentage calculated from the validator's $BGT boost out of the total $BGT boosted to all validators. Validators can direct their

$BGT emissions to whitelisted Reward Vaults of their choosing, and in exchange, they receive protocol-provided incentives from these Reward Vaults. Delegators, by staking their $BGT with validators, can influence the validator's boost and share in the rewards. Transaction fees on the network are paid in $BERA and are burned, removing them from the circulating supply. This structure ensures that all participants are motivated to contribute to the network's security and efficiency.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Injective Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Injective Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	242127.47488	kWh/a

Qualitative information

S.4 Consensus Mechanism

Injective Token is present on the following networks: Binance Smart Chain, Cosmos, Ethereum, Injective, Osmosis.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA).

This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
   - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.

- Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.

2. Modular Cosmos SDK Framework:
   - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.
   - Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Injective operates on a Tendermint-based Proof of Stake (PoS) consensus model, ensuring high throughput and immediate transaction finality.

Core Components:

- Tendermint-based Proof of Stake (PoS):
  Ensures instant transaction finality and supports efficient block production for high-speed transactions.
- Validator Selection:
  Validators are chosen based on the amount of INJ tokens staked, considering both self-staked and delegated tokens, to maintain a decentralized network.
- Delegation:
  INJ holders can delegate their tokens to validators, earning a share of staking rewards while participating in network governance.
- Instant Finality:
  The Tendermint consensus mechanism provides immediate finality, ensuring transactions cannot be reversed once validated.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Injective Token is present on the following networks: Binance Smart Chain, Cosmos, Ethereum, Injective, Osmosis.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.
2. Slashing for Accountability:
   Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:
   User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.
2. Customizable Fee Model:
   Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Injective incentivizes network participation through staking rewards and a unique transaction fee model that supports long-term value for INJ tokens.

Incentive Mechanisms:

Staking Rewards:
   INJ holders earn rewards for staking their tokens, encouraging active participation in securing the network.
Validator Rewards:
   Validators receive staking rewards and transaction fees for processing transactions and maintaining network security.

Applicable Fees:

Transaction Fees:
Users pay fees in INJ tokens for network transactions, including smart contract execution and trading.
Fee Structure:
A portion of transaction fees is burned via a weekly on-chain auction, reducing the overall supply of INJ tokens and supporting a deflationary tokenomics model.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, cosmos, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, cosmos, ethereum, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is

determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

KAVA

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	KAVA	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	236682.93600	kWh/a

Qualitative information

S.4 Consensus Mechanism

KAVA is present on the following networks: Binance Beacon Chain, Ethereum, Kava, Osmosis, Polygon.

Binance Beacon Chain operated on a Delegated Proof of Stake (DPoS) consensus mechanism before its operations were discontinued in fall 2024 and its migration to Binance Smart Chain; validators were elected by token holders through staking and voting, limiting active participation to a manageable number of nodes while maintaining decentralization; validators were selected based on the staking weight of their delegators, ensuring stakeholder interests were proportionally represented in the validation process; regular validator rotation was implemented to promote fairness and decentralization by allowing multiple participants to contribute to the network; the system was designed to tolerate some degree of validator failures while maintaining the network's operational integrity, ensuring resilience.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the

heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Kava employs the Tendermint Core consensus engine with a Proof of Stake (PoS) model, ensuring security, scalability, and decentralized decision-making.

Core Components:

- Tendermint Core (PBFT): A Practical Byzantine Fault Tolerance-based consensus engine provides fast block finality and ensures consistent transaction validation.
- Proof of Stake (PoS): Validators are selected based on the amount of KAVA tokens staked, with the top 100 nodes by bonded stake responsible for validating blocks.
- Validator Selection and Accountability: A slashing mechanism penalizes validators for malicious actions like double-signing or extended downtime, encouraging honest and reliable participation.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

KAVA is present on the following networks: Binance Beacon Chain, Ethereum, Kava, Osmosis, Polygon.

The Binance Beacon Chain incentivized validators and ensured fee transparency before its migration to Binance Smart Chain; validators were rewarded solely through transaction fees, with no block rewards provided, aligning incentives with network usage and transaction volume; transaction fees were calculated and displayed upfront, ensuring clarity for users and promoting trust in the fee structure; a portion of transaction fees collected in BNB was burned, reducing the overall token supply and contributing to a deflationary economic model.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Kava incentivizes network security and active participation through rewards and an inflationary model, aligning stakeholders' interests.

Incentive Mechanisms:

Validator Rewards:
Validators earn rewards in KAVA tokens from block rewards and transaction fees, compensating them for securing the network and processing transactions.
Staking Rewards:
KAVA holders can delegate their tokens to validators to earn a share of rewards while participating in network governance.

Applicable Fees:

Transaction Fees:
Users pay fees in KAVA tokens for transactions, which are distributed among validators and delegators, supporting network maintenance.
Inflation Mechanism:
New KAVA tokens are minted to fund ecosystem initiatives like Kava Rise, which supports decentralization, security, and ecosystem stability.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These

assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_beacon_chain, ethereum, osmosis, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SEI

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SEI	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	210305.17440	kWh/a

Qualitative information

S.4 Consensus Mechanism

SEI is present on the following networks: Osmosis, Sei.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Sei leverages its Twin-Turbo consensus mechanism, integrating advanced transaction processing techniques with the reliability of Tendermint Core, to achieve high performance and security.

Core Components:

- Twin-Turbo Consensus:
  - Optimistic Block Processing: Validators process transactions optimistically, assuming their validity, reducing latency and increasing throughput.
  - Intelligent Block Propagation: Compressed block proposals containing transaction hashes enable validators to reconstruct blocks locally, expediting consensus.
  - Single Slot Finality: Ensures immediate block finality upon addition, eliminating the need for confirmations and minimizing the risk of chain reorganizations.
- Tendermint Core Integration:
  Incorporates Byzantine Fault Tolerance (BFT) to maintain security and resilience, safeguarding the network against malicious actors.

S.5 Incentive Mechanisms and Applicable Fees

SEI is present on the following networks: Osmosis, Sei.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

The Sei Network incentivizes participation through staking rewards and a transparent fee structure, supporting its decentralized ecosystem.

Incentive Mechanisms:

- Staking Rewards: Validators and delegators earn SEI tokens as rewards for securing the network through staking, promoting active engagement and long-term commitment.
- Governance Participation: SEI token holders can participate in network governance decisions, influencing protocol upgrades and key changes.

Applicable Fees:

Transaction Fees: Users pay fees in SEI tokens for network transactions. These fees are distributed to validators and delegators as rewards, supporting network operations and security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Cosmos ATOM

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/

Field	Value	Unit
S.3 Name of the crypto-asset	Cosmos ATOM	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	186483.55960	kWh/a

Qualitative information

S.4 Consensus Mechanism

Cosmos ATOM is present on the following networks: Binance Smart Chain, Bitsong, Cosmos, Cronos, Ethereum, Injective, Osmosis.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.

8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

BitSong operates on a Delegated Proof-of-Stake (DPoS) consensus mechanism. In this model, BTSG token holders delegate their tokens to validators, who are responsible for producing and validating new blocks. The selection of validators is based on the amount of BTSG tokens staked and the duration of staking, which determines their voting power in the network's governance processes.

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
   - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.
   - Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.
2. Modular Cosmos SDK Framework:
   - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.
   - Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

Cronos operates on a Proof of Stake (PoS) model integrated with Tendermint's Byzantine Fault Tolerant (BFT) consensus, designed for decentralization, security, and interoperability. This model enables validators to be selected based on staking power, rewarding them for securing and validating the network.

Core Components:

- Proof of Stake (PoS) with Tendermint BFT Validator Selection: Validators are chosen based on the amount of CRO tokens staked, securing the network and producing blocks.
- Delegation Model: Token holders can delegate their CRO to validators, enabling participation in network security without needing to run a validator node.
- Cosmos SDK and Inter-Blockchain Communication (IBC) Cross-Chain Connectivity: Built on the Cosmos SDK, Cronos enables cross-chain communication, connecting to other Cosmos blockchains and ecosystems such as Ethereum and Binance Smart Chain.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Injective operates on a Tendermint-based Proof of Stake (PoS) consensus model, ensuring high throughput and immediate transaction finality.

Core Components:

- Tendermint-based Proof of Stake (PoS):
  Ensures instant transaction finality and supports efficient block production for high-speed transactions.
- Validator Selection:
  Validators are chosen based on the amount of INJ tokens staked, considering both self-staked and delegated tokens, to maintain a decentralized network.
- Delegation:
  INJ holders can delegate their tokens to validators, earning a share of staking rewards while participating in network governance.
- Instant Finality:
  The Tendermint consensus mechanism provides immediate finality, ensuring transactions cannot be reversed once validated.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Cosmos ATOM is present on the following networks: Binance Smart Chain, Bitsong, Cosmos, Cronos, Ethereum, Injective, Osmosis.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The native token, BTSG, serves multiple roles within the BitSong ecosystem, including transaction fee payments, staking, and governance participation. Validators earn rewards from transaction fees and block rewards, with a portion of these rewards distributed to delegators after deducting the validator's commission.

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.
2. Slashing for Accountability:
   Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:
   User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.
2. Customizable Fee Model:
   Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

Cronos incentivizes validators and delegators with staking rewards and transaction fees, aligning economic incentives with network security and growth.

Incentive Mechanisms:

- Staking Rewards Validators and Delegators: Both groups earn CRO rewards for supporting network security. Delegators earn a portion of the validator rewards, promoting broader network participation.
- Deflationary Mechanism Token Burning: A portion of transaction fees and staking rewards may be periodically burned, reducing CRO supply over time and potentially increasing token value.

Applicable Fees:

- Transaction and Smart Contract Fees Standard Transactions: Users pay CRO for network transactions and dApp interactions, providing a steady income for validators.
- Ethereum-Compatible Gas Fees: Executing Ethereum-compatible smart contracts incurs gas fees, similar to Ethereum, payable in CRO.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Injective incentivizes network participation through staking rewards and a unique transaction fee model that supports long-term value for INJ tokens.

Incentive Mechanisms:

Staking Rewards:
INJ holders earn rewards for staking their tokens, encouraging active participation in securing the network.
Validator Rewards:
Validators receive staking rewards and transaction fees for processing transactions and maintaining network security.

Applicable Fees:

Transaction Fees:
Users pay fees in INJ tokens for network transactions, including smart contract execution and trading.
Fee Structure:
A portion of transaction fees is burned via a weekly on-chain auction, reducing the overall supply of INJ tokens and supporting a deflationary tokenomics model.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are

assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, bitsong, cosmos, cronos, ethereum, injective, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

canton

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	canton	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	184222.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Canton Network uses a “proof-of-stakeholder” consensus model. Participants who are stakeholders in a given transaction validate that transaction, while a separate synchronization domain (sync domain) sequences transactions and ensures ordering through a Byzantine Fault Tolerant protocol in its decentralized mode.

S.5 Incentive Mechanisms and Applicable Fees

Fees paid in the network’s native token are burned, while new tokens are minted as rewards based on participants’ contribution to network utility. Rewards are allocated across infrastructure providers, application builders, and users in line with their roles and the value they bring to the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Terra

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Terra	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	183960.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Terra 2.0 is a Layer 1 blockchain developed with the Cosmos SDK and utilizes the Tendermint BFT (Byzantine Fault Tolerance) consensus protocol. This architecture allows Terra 2.0 to act as a standalone blockchain within the Cosmos ecosystem and benefit from Inter-Blockchain Communication (IBC) to enable seamless interactions with other blockchains.

The Tendermint BFT consensus protocol implemented in Terra 2.0 combines a classic Byzantine fault tolerance approach with a Delegated Proof-of-Stake (DPoS) system. Validators are selected by staking LUNA tokens and are responsible for validating transactions and creating new blocks.

S.5 Incentive Mechanisms and Applicable Fees

Terra 2.0, validators are incentivized through staking rewards, which are distributed to maintain the network's security and functionality. These rewards are derived from a combination of transaction

fees (referred to as gas fees), seigniorage (if applicable), and other network-specific revenue sources.

Validators share these rewards with delegators, who stake their LUNA tokens by delegating them to validators.

Transaction fees in Terra 2.0 are paid in LUNA, the network's native token. These fees are calculated based on the computational resources required to process transactions, such as smart contract execution or token transfers.

The fee structure follows a 'base fee plus priority fee' model, where users can pay an additional fee to prioritize their transactions during periods of high network congestion. Fees serve two purposes: they prevent spam attacks by adding a cost to every transaction and provide financial rewards to validators for processing transactions.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, cosmos, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Flare

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Flare	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	170820.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Flare Blockchain uses a unique consensus mechanism known as Avalanche Consensus combined with a Federated Byzantine Agreement (FBA) model to provide scalability, security, and decentralization. Flare aims to enable interoperability between blockchains by connecting smart contract platforms to non-Turing complete networks like Bitcoin, and this consensus mechanism plays a crucial role in the network's overall operation.

Key Features of Flare's Consensus Mechanism:

1. Avalanche Consensus:
   - Scalable and Fast: The Avalanche consensus is designed for high throughput and low latency. It uses a gossip protocol for communication between nodes, which helps achieve consensus faster than traditional consensus mechanisms like Proof-of-Work (PoW) or Proof-of-Stake (PoS). Nodes quickly confirm transaction validity by repeatedly querying other nodes, increasing network speed.
   - Decentralized and Secure: This consensus mechanism doesn't require heavy computational power like PoW, making it more energy-efficient while maintaining robust security.
2. Federated Byzantine Agreement (FBA):
   - Federated Nodes: FBA ensures that nodes within the Flare network reach a consensus without needing to rely on a central authority. The network uses a set of trusted "federated" nodes that help maintain consensus, allowing nodes outside the federated set to participate without requiring full trust.
   - Leaderless Consensus: FBA allows for a leaderless and decentralized structure, where each node can validate transactions independently, enhancing both security and decentralization.
3. Interoperability: Flare's consensus mechanism is designed to allow cross-chain communication, particularly bridging the gap between Turing-complete smart contract platforms like Ethereum and non-Turing-complete chains like Bitcoin. This makes it possible to bring data and value from non-smart contract chains into the smart contract ecosystem.

S.5 Incentive Mechanisms and Applicable Fees

Flare Network employs a multifaceted incentive mechanism to promote active participation and ensure the network's security and efficiency.

Incentive Mechanisms:

1. FTSO Delegation Rewards: Flare Time Series Oracle (FTSO) data providers offer price feeds to the network. Users can delegate their FLR tokens to these providers, earning a share of the rewards based on the accuracy of the data provided. 2. FlareDrops: A portion of FLR tokens is distributed monthly to WFLR holders through FlareDrops. This incentivizes users to hold and utilize WFLR tokens within the ecosystem.
3. rFLR Rewards: Reward FLR (rFLR) tokens are distributed monthly to enhance liquidity in Flare's DeFi ecosystem. Users can earn rFLR by participating in various DeFi activities, such as lending or borrowing assets.
4. FLR Protocol Emissions: Selected decentralized applications (dApps) launching on Flare receive FLR emissions to incentivize user participation and liquidity provision.

Applicable Fees:

1. Transaction Fees: Users pay FLR tokens to execute transactions on the network, compensating validators for processing and confirming transactions.
2. Staking Fees: When delegating FLR tokens to FTSO data providers or participating in staking activities, users may incur fees associated with these services.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

nillion

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	nillion	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	170294.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Nillion introduces a fundamentally different architecture compared to traditional blockchains by eliminating the need for consensus-based validation of every transaction. Instead of using mechanisms like Proof of Work or Proof of Stake, Nillion employs cryptographic frameworks such as Secure Multi-Party Computation (MPC) and Homomorphic Encryption to distribute and process data.

S.5 Incentive Mechanisms and Applicable Fees

The Nillion network uses its native utility token, NIL, to incentivize and sustain participation across various layers of the system. Users pay with NIL tokens for services such as private computation and data storage, ensuring access to the network's privacy-enhancing capabilities. Participants who contribute to the network's operations—such as node operators—can stake NIL tokens to support network security and performance, receiving staking rewards proportional to their contribution.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

autonomys

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	autonomys	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	144540.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Autonomys uses a Proof-of-Archival-Storage (PoAS) consensus mechanism, where node operators store encoded segments of the blockchain history and participate in block production, paired with a Proof-of-Time (PoT) chain maintained by "Timekeeper" nodes to enforce verifiable timing and provide secure randomness.

S.5 Incentive Mechanisms and Applicable Fees

autonomys is present on the following networks: Autonomys.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Terra Classic

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Terra Classic	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	131400.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Terra blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, which ensures fast, scalable, and secure transaction processing.

Core Components:

- Delegated Proof of Stake (DPoS):
  - Validators: A limited set of validators are responsible for validating transactions, proposing blocks, and securing the network. Validators are selected based on the amount of LUNA tokens staked, either directly or delegated by token holders.

  - Delegation: LUNA holders can delegate their tokens to validators, allowing them to participate in staking rewards without running their own validator nodes.
  - Rotational Leadership: Validators are selected in a round-robin manner to propose new blocks, ensuring fairness and efficiency in block production.
- Tendermint BFT (Byzantine Fault Tolerance):
  - Terra integrates the Tendermint Core consensus engine, providing fast block finality and resilience against up to one-third of malicious or faulty validators.
  - Finality: Transactions are confirmed once a block is added, reducing the risk of chain reorganizations and ensuring immediate finality.
  - Governance Integration: LUNA token holders participate in governance by voting on proposals related to protocol upgrades, parameter changes, and community decisions, aligning stakeholder incentives with network health.

S.5 Incentive Mechanisms and Applicable Fees

The Terra blockchain's incentive structure is designed to reward network participants, ensure security, and sustain ecosystem growth, while its fee model aligns with its focus on scalability and cost-efficiency.

Incentive Mechanisms:

- Validators: Validators earn staking rewards for their role in securing the network and validating transactions. Rewards are distributed in LUNA tokens, derived from transaction fees and seigniorage revenue.
- Delegators: LUNA holders who delegate their tokens to validators receive a share of staking rewards, proportional to the amount delegated, incentivizing broad participation.
- Seigniorage Rewards: Validators and delegators benefit from seigniorage revenue, generated when new stablecoins (e.g., TerraUSD) are minted. A portion of this revenue is allocated to reward LUNA stakers.
- Stability Incentives: LUNA token holders are incentivized to stake and participate in governance to maintain the stability of Terra's ecosystem and its algorithmic stablecoins.
- Governance Participation Rewards: Validators and delegators have governance voting rights, enabling them to shape the network's future. Participation in governance aligns incentives with long-term ecosystem health.

Applicable Fees:

- Transaction Fees: Users pay fees in LUNA or stablecoins for transactions such as fund transfers, smart contract execution, and staking. These fees are distributed among validators and delegators, providing additional incentives for network security and functionality.
- Dynamic Fee Model: Transaction fees are dynamically adjusted based on network congestion and transaction size. This ensures efficient resource allocation while keeping fees affordable for users.
- Seigniorage Fee: A portion of revenue from stablecoin minting is directed to the treasury and distributed to stakers, reinforcing network participation and development.
- Burning Mechanism: A portion of fees and seigniorage revenue may be burned, reducing LUNA supply over time and contributing to its deflationary tokenomics.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) terra_classic is calculated first. For the energy consumption of the token, a fraction of the energy

consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ICON

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ICON	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	115106.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The ICON blockchain operates on a Delegated Proof of Contribution (DPoC) consensus mechanism, an innovative approach designed to reward network participants based on their contributions while ensuring robust decentralization and scalability.

Core Components:

- Delegated Proof of Contribution (DPoC):
  DPoC extends beyond traditional Delegated Proof of Stake (DPoS) by factoring in each participant's contributions to the ecosystem, such as governance participation, network development, or community engagement. Validators, called Public Representatives (P-Reps), are elected by token holders based on their stake and perceived contributions to the network.
- P-Rep Election and Roles:
  P-Reps validate transactions, produce blocks, and maintain the network's integrity. The top-ranked P-Reps participate actively in governance decisions, while sub-P-Reps serve as backup nodes, ensuring redundancy and decentralization.
- Scalability via Loop Fault Tolerance (LFT):
  ICON employs LFT, an advanced Byzantine Fault Tolerance (BFT) algorithm, to enhance consensus speed and reduce latency while maintaining high fault tolerance.

S.5 Incentive Mechanisms and Applicable Fees

The ICON blockchain incentivizes network participants through a well-structured reward system and applies a straightforward fee model to support network operations and encourage ecosystem growth.

Incentive Mechanism:

- P-Rep Rewards: Public Representatives (P-Reps) earn rewards in ICX tokens for validating transactions, producing blocks, and maintaining the network. Rewards are distributed based on the rank and contribution of each P-Rep, incentivizing high performance and active participation.
- Delegator Rewards: ICON token holders who delegate their ICX tokens to P-Reps earn staking rewards proportional to their stake. This delegation model encourages broader participation and enhances network security by increasing staked ICX.
- Contribution Proposal System (CPS): CPS rewards community developers and projects that contribute to ICON's ecosystem. Approved proposals receive funding in ICX, promoting continuous network development.

Applicable Fees:

- Transaction Fees: Users pay fees in ICX tokens for transactions, such as transfers, smart contract executions, and interactions with decentralized applications (dApps). Fees are dynamically adjusted based on network activity to balance affordability and resource usage.
- Governance-Driven Allocation: A portion of transaction fees is redistributed to P-Reps and delegators, aligning incentives with network activity and maintaining security.
- Fee Sharing: ICON's fee-sharing model supports dApp developers by redistributing part of the fees generated by their applications, fostering innovation and adoption within the ecosystem.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Neutron

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Neutron	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	113135.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Neutron is a Cosmos-based blockchain that operates as a consumer chain under the Interchain Security model. It relies on the Cosmos Hub validator set for consensus and finality, without running its own validators.

S.5 Incentive Mechanisms and Applicable Fees

Transaction fees on Neutron are paid in NTRN and support validator rewards via the Cosmos Hub. NTRN is also used for governance within the Neutron network, allowing token holders to participate in protocol decisions.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Cronos

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/

Field	Value	Unit
S.3 Name of the crypto-asset	Cronos	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	110051.29210	kWh/a

Qualitative information

S.4 Consensus Mechanism

Cronos is present on the following networks: Cosmos, Cronos, Cronos Pos, Ethereum, Osmosis, Solana.

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
   - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.
   - Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.
2. Modular Cosmos SDK Framework:
   - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.
   - Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

Cronos operates on a Proof of Stake (PoS) model integrated with Tendermint's Byzantine Fault Tolerant (BFT) consensus, designed for decentralization, security, and interoperability. This model enables validators to be selected based on staking power, rewarding them for securing and validating the network.

Core Components:

- Proof of Stake (PoS) with Tendermint BFT Validator Selection: Validators are chosen based on the amount of CRO tokens staked, securing the network and producing blocks.
- Delegation Model: Token holders can delegate their CRO to validators, enabling participation in network security without needing to run a validator node.
- Cosmos SDK and Inter-Blockchain Communication (IBC) Cross-Chain Connectivity: Built on the Cosmos SDK, Cronos enables cross-chain communication, connecting to other Cosmos blockchains and ecosystems such as Ethereum and Binance Smart Chain.

The Cronos POS Chain operates as a Layer-0 blockchain within the Cosmos ecosystem, utilizing the Tendermint Byzantine Fault Tolerant (BFT) consensus engine. It employs a Delegated Proof-of-Stake (DPoS) model, where the top 100 validators by total staked CRO tokens form the active set responsible for block production and network security.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Cronos is present on the following networks: Cosmos, Cronos, Cronos Pos, Ethereum, Osmosis, Solana.

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.

2. Slashing for Accountability:
   Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:
   User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.
2. Customizable Fee Model:
   Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

Cronos incentivizes validators and delegators with staking rewards and transaction fees, aligning economic incentives with network security and growth.

Incentive Mechanisms:

- Staking Rewards Validators and Delegators: Both groups earn CRO rewards for supporting network security. Delegators earn a portion of the validator rewards, promoting broader network participation.
- Deflationary Mechanism Token Burning: A portion of transaction fees and staking rewards may be periodically burned, reducing CRO supply over time and potentially increasing token value.

Applicable Fees:

- Transaction and Smart Contract Fees Standard Transactions: Users pay CRO for network transactions and dApp interactions, providing a steady income for validators.
- Ethereum-Compatible Gas Fees: Executing Ethereum-compatible smart contracts incurs gas fees, similar to Ethereum, payable in CRO.

The Cronos POS Chain uses its native CRO token to coordinate economic incentives and governance. Validators are rewarded for producing and validating blocks through a combination of inflationary block rewards and transaction fees. Transaction fees, also paid in CRO, are distributed between validators and a community pool.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, cosmos, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) cosmos, cronos_pos, ethereum, osmosis, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the

hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

XDC Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	XDC Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	105120.35465	kWh/a

Qualitative information

S.4 Consensus Mechanism

XDC Network is present on the following networks: Ethereum, Xdc Network.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

XinFin Network operates on a modified Delegated Proof of Stake (XDPoS) model, XDPoS 2.0, which ensures scalability, security, and efficiency suitable for enterprise applications.

Core Components:

1. XDPoS 2.0 (Delegated Proof of Stake):
   Masternode System: Validators, known as masternodes, are required to stake XDC tokens to participate in transaction validation and block production. Validators are selected based on both stake size and community votes, ensuring only reliable nodes secure the network.

2. Double Validation Feature:
   - Enhanced Security: Each transaction is validated by two independent validators before it's finalized, reducing the risk of double-spending or malicious behavior and increasing network reliability.
   - Randomized Validator Rotation: Validators are selected in a rotating and randomized manner, preventing any single validator from consistently producing blocks, which enhances decentralization and security.

S.5 Incentive Mechanisms and Applicable Fees

XDC Network is present on the following networks: Ethereum, Xdc Network.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

XinFin incentivizes both validators and token holders to actively participate in network security and stability through staking and fee distribution mechanisms.

Incentive Mechanisms:

1. Staking Rewards:
   - Validator Rewards: Validators earn XDC token rewards for validating transactions and maintaining network security.
   - Delegator Rewards: XDC holders who delegate their tokens to validators receive a share of staking rewards, promoting community participation without requiring users to operate nodes.
2. Delegation Model:
   Passive Income: XDC holders can delegate tokens to validators, enabling them to earn rewards passively and boosting network security through broader staking participation.

Applicable Fees:

- Fee Distribution: All transactions incur XDC fees, which are distributed to validators as additional rewards for their role in securing the network.
- Predictable Fees for Enterprises: Transaction fees are kept low and predictable, supporting XinFin's focus on enterprise use cases in finance, trade, and cross-border payments.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The

energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Polygon POL

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Polygon POL	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	96916.71709	kWh/a

Qualitative information

S.4 Consensus Mechanism

Polygon POL is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon

Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Polygon POL is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.

- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Qtum

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Qtum	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	91191.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Qtum combines the security of Bitcoin's Unspent Transaction Output (UTXO) model with Ethereum-style smart contracts, using a Proof of Stake (PoS) consensus mechanism. This innovative hybrid approach supports decentralized applications (dApps) while ensuring secure and efficient transaction validation.

Core Components:

- Proof of Stake (PoS): Qtum operates on a PoS consensus, enabling QTUM token holders to participate in block validation based on the number of tokens they stake. There is no minimum staking requirement, so all QTUM holders are eligible to participate in staking and earn rewards, promoting accessibility and decentralization.
- Hybrid UTXO and Smart Contract Structure UTXO Model: Qtum retains Bitcoin’s UTXO model, which enhances transaction security by providing discrete transaction outputs.
- Ethereum-Compatible Smart Contracts: Qtum integrates Ethereum’s smart contract capabilities, allowing for the creation and execution of decentralized applications.
- Account Abstraction Layer (AAL): The AAL serves as a bridge between the UTXO model and Ethereum-style smart contracts, enabling smart contracts to operate on top of the UTXO structure. This layer makes Qtum compatible with existing Ethereum smart contracts, allowing developers to deploy Ethereum dApps on Qtum’s blockchain while benefiting from UTXO’s security. Qtum’s consensus mechanism supports a hybrid blockchain architecture that provides enhanced security, flexibility for dApps, and accessibility for a wide range of users.

S.5 Incentive Mechanisms and Applicable Fees

Qtum incentivizes stakers to secure the network by rewarding them with both block rewards and transaction fees. This structure supports decentralized participation and promotes consistent network performance.

Incentive Mechanisms:

- Staking Rewards Block Rewards: Validators (stakers) are rewarded with QTUM tokens for producing new blocks, incentivizing them to maintain the security and stability of the network.
- Transaction Fees: Stakers also earn transaction fees from transactions within the blocks they validate. This dual-reward model aligns validator incentives with overall network activity and performance.
- Accessibility of Staking No Minimum Staking Requirement: Unlike many PoS blockchains, Qtum allows staking with any amount of QTUM, making staking accessible to a wide range of users, from small holders to larger stakeholders. This open approach promotes decentralization and broader community participation.
- Smart Contract Fees Gas-Like Fee Structure: Qtum charges fees for executing smart contracts, similar to Ethereum's gas model. These fees are paid in QTUM and contribute to staking rewards, incentivizing validators to support dApps and smart contract functionality on the network.

Applicable Fees: Transaction Fees Users pay transaction fees in QTUM for transferring funds and interacting with smart contracts. These fees are essential for network operations and are distributed to stakers, enhancing their reward structure. Smart Contract Execution Fees The gas-like fees applied to smart contract execution incentivize support for dApps on the network and provide an additional revenue stream for stakers, further aligning their participation with network growth.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Binance Coin



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/

Field	Value	Unit
S.3 Name of the crypto-asset	Binance Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	90228.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Coin is present on the following networks: Binance Smart Chain, Opbnb.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.

8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Coin is present on the following networks: Binance Smart Chain, Opbnb.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Sonic



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Sonic	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	84358.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Sonic utilizes a Proof-of-Stake (PoS) consensus mechanism integrated with a Directed Acyclic Graph (DAG) architecture to enhance scalability and efficiency. Validators are required to stake the network's native $S tokens, with a minimum of 500,000 $S tokens needed to operate a validator node. This substantial staking requirement ensures that validators have a significant investment in the network's integrity.

S.5 Incentive Mechanisms and Applicable Fees

Sonic's economic model is designed to incentivize active participation from both validators and developers. Validators earn rewards through a combination of block rewards and transaction fees. The block reward system employs a dynamic Annual Percentage Rate (APR) mechanism.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

BSquared Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	BSquared Network	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	84353.11855	kWh/a

Qualitative information

S.4 Consensus Mechanism

BSquared Network is present on the following networks: B2 Network, Binance Smart Chain.

The consensus mechanism of the B^2 Network is based on a zk-rollup model. Transactions are executed off-chain, aggregated and a zk-proof is generated by B^2 Network's B^2 Rollup afterwards transactions are stored and the proof is verified by B^2 Network's B^2 Hub before the proof ist stored to the Bitcoin blockchain via Taproot commitments. Sequencing, transaction storage and coordination of transactions are carried out by a network of B^2 nodes which use a Proof of Stake consensus to coordinate. This design is intended to provide scalability and efficiency, while ultimate security is derived from Bitcoin finality.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.

6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

BSquared Network is present on the following networks: B2 Network, Binance Smart Chain.

The B^2 Network employs a fee and incentive structure designed to sustain network operations and participation. Transaction fees within the rollup environment are paid in bridged BTC, which serves as the native gas asset. These fees are shared between the network and integrated protocols, such as bridges and decentralized applications. They also finance transaction costs for storing commitments on Bitcoin. The network also supports fraud proofs to challenge possibly fraudulent/ faulty withdrawels of tokens from the networks. Such Fraud proofs typically involve economic incentives for the parties challinging each other. In addition the proof of stake component (paid in B2) of the network incentivizes validators by givem then the ability to earn staking rewards and the risk of loosing part of their stake for failing in their responsibilities.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) b2_network, binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Hedera HBAR

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Hedera HBAR	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	82125.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Hedera Hashgraph operates on a unique Hashgraph consensus algorithm, a directed acyclic graph (DAG) system that diverges from traditional blockchain technology. It uses Asynchronous Byzantine Fault Tolerance (aBFT) to secure the network.

Core Components:

1. Hashgraph Consensus and aBFT:
   Hedera Hashgraph's consensus mechanism achieves aBFT, which allows the network to tolerate malicious nodes without compromising security, ensuring high levels of fault tolerance and stability.
2. Gossip about Gossip Protocol:
   The network employs a "Gossip about Gossip" protocol, where nodes share transaction information along with details of previous gossip events. This process allows each node to rapidly learn the entire network state, enhancing communication efficiency and minimizing latency.
3. Virtual Voting:
   Hedera does not rely on traditional miners or stakers. Instead, it uses virtual voting, where nodes reach consensus by analyzing the gossip history and simulating votes based on the order and frequency of transactions received. Virtual voting eliminates the need for actual voting messages, reducing network congestion and speeding up consensus.
4. Deterministic Finality:
   Once consensus is reached, transactions achieve deterministic finality instantly, making them irreversible and confirmed within seconds. This attribute is ideal for applications needing quick and irreversible transaction confirmations.
5. Staking for Network Security:
   Hedera incorporates staking to bolster network security. HBAR holders can stake their tokens to support validator nodes, contributing to the network's resilience and encouraging long-term engagement in consensus operations.

S.5 Incentive Mechanisms and Applicable Fees

Hedera Hashgraph incentivizes network participation through transaction fees and staking rewards, with a structured and predictable fee model designed for enterprise use.

Incentive Mechanisms:

1. Staking Rewards for Nodes:
   - HBAR Rewards for Node Operators: Node operators earn HBAR rewards for providing network security and processing transactions, incentivizing them to act honestly and support network stability.
   - User Staking: HBAR holders can stake their tokens to support nodes. Staking rewards offer an additional incentive for token holders to engage in network operations, although the structure may evolve with network growth.
2. Service-Based Node Rewards:
   Nodes receive rewards based on specific services they provide to the network, such as:
   - Consensus Services: Reaching consensus and maintaining transaction order.
   - File Storage: Storing data on the Hedera network.
   - Smart Contract Processing: Supporting contract executions for decentralized applications.

Applicable Fees:

1. Predictable Transaction Fees: Hedera's fee structure is fixed and predictable, ensuring transparent costs for users and appealing to enterprise-grade applications. Transaction fees are paid in HBAR and are designed to be stable, making it easier for businesses to plan for usage costs.
2. Fee Allocation: All transaction fees collected in HBAR are distributed to network nodes as rewards, reinforcing their role in maintaining network integrity and processing transactions efficiently.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Mina

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Mina	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	81205.20000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Mina is present on the following networks: Ethereum, Mina.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Mina operates on a unique Proof-of-Stake (PoS) consensus protocol called Ouroboros Samasika, which is adapted to work with Mina's succinct blockchain structure. This innovative approach enables Mina to maintain a lightweight and efficient blockchain while ensuring security and decentralization.

Core Components of Mina's Consensus:

1. Ouroboros Samasika PoS Protocol:
   Adaptation of Cardano's Ouroboros: Mina's PoS mechanism, Ouroboros Samasika, is a modified version of Cardano's Ouroboros PoS. It has been specifically optimized for Mina's succinct blockchain model, which requires minimal data storage for validating the entire chain.
2. Succinct Blockchain (Constant Size):
   - 22 KB Fixed Size: Unlike traditional blockchains, Mina maintains a minimal, fixed-size blockchain of around 22 KB. It achieves this through the use of recursive zero-knowledge proofs (zk-SNARKs), which compress the entire blockchain into a single, verifiable proof that any node can validate.
   - Efficient Verification: This succinct structure allows Mina to operate efficiently without requiring nodes to store vast amounts of historical data. Instead, each node validates the chain by verifying a concise zk-SNARK proof, maintaining security and scalability.
3. Leader Election with Verifiable Random Function (VRF):
   Randomized Validator Selection: Mina's leader election process is conducted through a Verifiable Random Function (VRF), which randomly selects validators to produce blocks based on their stake. This randomization enhances security, prevents manipulation, and ensures a decentralized network.

4. Fork Resolution:
   Longest-Chain Rule: Mina employs a longest-chain rule with Ouroboros Samasika. The chain with the most accumulated proof-of-stake work is considered the valid chain. However, due to zk-SNARKs, Mina reduces the chain data required to verify the blockchain, making fork resolution more efficient.

S.5 Incentive Mechanisms and Applicable Fees

Mina is present on the following networks: Ethereum, Mina.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Mina incentivizes participants through block rewards, transaction fees, and a unique role called Snarkers to support network security, stability, and the succinct blockchain model.

Incentive Mechanisms:

1. Block Rewards for Validators (Block Producers):
   - Incentivizing Security and Block Production: Validators, known as block producers, earn block rewards for successfully producing blocks. These rewards provide an incentive for users to stake their tokens and contribute to network security and block production.
   - Inflationary Model: Mina has an inflationary token supply, where new tokens are minted as block rewards. This inflation rate is designed to decrease over time to reach a stable token supply, balancing incentives with long-term sustainability.
2. Transaction Fees:
   - Ongoing Rewards: Validators also earn transaction fees from the transactions included in each block, providing a continuous reward mechanism that grows as network usage increases.
   - Dynamic Fees During Congestion: Although Mina's transaction fees are generally flat, they can increase during times of high network demand. Validators can set higher fees to prioritize transactions, ensuring efficient block production during peak periods.
3. Incentives for Snarkers (Proof Generators):
   - Role of Snarkers: Mina introduces Snarkers (or Snark Workers), a unique role in the network responsible for generating zk-SNARKs to verify the blockchain's state. These zk-SNARK proofs are essential for maintaining Mina's succinct structure.
   - Compensation by Block Producers: Block producers pay Snarkers for their zk-SNARK proofs, creating a decentralized market for proof generation. This setup incentivizes individuals to produce these essential proofs, decentralizing the proof-generation process and supporting network functionality.

Applicable Fees:

Flat Transaction Fees with Dynamic Adjustments: Mina's transaction fees are typically flat, making the network accessible and predictable for users. However, during periods of network congestion,

validators may set higher fees to prioritize transactions with higher fees, ensuring that critical transactions can be processed quickly.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Celestia

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Celestia	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	80791.97748	kWh/a

Qualitative information

S.4 Consensus Mechanism

Celestia is present on the following networks: Celestia, Injective, Osmosis.

Celestia employs a Proof-of-Stake (PoS) consensus mechanism, wherein validators are selected based on the amount of TIA tokens they stake. These validators are responsible for ordering transactions and ensuring data availability within the network.

Injective operates on a Tendermint-based Proof of Stake (PoS) consensus model, ensuring high throughput and immediate transaction finality.

Core Components:

- Tendermint-based Proof of Stake (PoS):
  Ensures instant transaction finality and supports efficient block production for high-speed transactions.
- Validator Selection:
  Validators are chosen based on the amount of INJ tokens staked, considering both self-staked and delegated tokens, to maintain a decentralized network.
- Delegation:
  INJ holders can delegate their tokens to validators, earning a share of staking rewards while participating in network governance.
- Instant Finality:
  The Tendermint consensus mechanism provides immediate finality, ensuring transactions cannot be reversed once validated.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Celestia is present on the following networks: Celestia, Injective, Osmosis.

The native token, TIA, serves multiple roles within the Celestia ecosystem. Validators earn rewards in TIA for participating in the consensus process and maintaining data availability. Users pay transaction fees in TIA when submitting data to the network.

Injective incentivizes network participation through staking rewards and a unique transaction fee model that supports long-term value for INJ tokens.

Incentive Mechanisms:

Staking Rewards:
INJ holders earn rewards for staking their tokens, encouraging active participation in securing the network.
Validator Rewards:
Validators receive staking rewards and transaction fees for processing transactions and maintaining network security.

Applicable Fees:

Transaction Fees:
Users pay fees in INJ tokens for network transactions, including smart contract execution and trading.
Fee Structure:
A portion of transaction fees is burned via a weekly on-chain auction, reducing the overall supply of INJ tokens and supporting a deflationary tokenomics model.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are

assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) injective, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Akash

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Akash	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	79628.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
   - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.
   - Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.

2. Modular Cosmos SDK Framework:
   - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.
   - Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

S.5 Incentive Mechanisms and Applicable Fees

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.
2. Slashing for Accountability:
   Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:
   User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.
2. Customizable Fee Model:
   Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) cosmos is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Energy Web Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Energy Web Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	79628.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Energy Web Chain employs a Proof-of-Authority (PoA) consensus mechanism, wherein a set of pre-approved validator nodes—typically reputable energy companies and grid operators—are authorized to validate transactions and create new blocks.

S.5 Incentive Mechanisms and Applicable Fees

The native token, Energy Web Token (EWT), serves multiple functions within the Energy Web ecosystem. It is used to pay for transaction fees on the Energy Web Chain, compensate validators for processing transactions, and interact with services like Energy Web X and worker nodes.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ROSE



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ROSE	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	79368.23018	kWh/a

Qualitative information

S.4 Consensus Mechanism

ROSE is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Rose, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA).

This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Emerald Oasis Network utilizes a two-layer architecture to ensure security, scalability, and flexibility for various applications.

Core Components:

1. Consensus Layer (Proof of Stake):
   The Consensus Layer operates on a Proof of Stake (PoS) mechanism. Validators stake ROSE tokens to secure the network and validate blocks, with rewards distributed based on stake size and validator performance.
2. ParaTime Layer (Parallel Execution Environments):
   - Independent ParaTimes: This layer supports the parallel execution of multiple ParaTimes, each tailored to specific workloads like DeFi or privacy-preserving applications. Each ParaTime runs in isolation, allowing for optimized performance without affecting others.
   - Trusted Execution Environments (TEEs): Some ParaTimes use TEEs to provide enhanced privacy, ensuring confidential data handling even from validators, which enables privacy-preserving smart contracts.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

ROSE is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Rose, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.

- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Emerald Oasis Network incentivizes both validators and token holders, fostering network security and scalability through staking and customizable transaction fees.

Incentive Mechanisms:

- Staking Rewards: Validators earn ROSE tokens for securing the Consensus Layer. Rewards are based on performance, encouraging validators to act reliably.
- Delegation Rewards: Token holders can delegate their ROSE tokens to validators, earning a share of staking rewards, which promotes wider network participation.
- Slashing Penalties: Validators face slashing penalties for malicious actions, such as double-signing, ensuring secure network behavior.

Applicable Fees:

ParaTime-Specific Fees: Fees are paid in ROSE tokens and vary by ParaTime based on computational and privacy requirements. Some ParaTimes are optimized for privacy-focused transactions, while others prioritize high throughput for large-scale applications.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating

the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Fantom

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Fantom	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	78840.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.

- DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.

2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

S.5 Incentive Mechanisms and Applicable Fees

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are

assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SNEK 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SNEK	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	68795.20009	kWh/a

Qualitative information

S.4 Consensus Mechanism

Core Components: Cardano uses the Ouroboros consensus mechanism, a Proof of Stake (PoS) protocol designed for scalability, security, and energy efficiency.

Core Concepts:

1. Proof of Stake (PoS): Validators (called slot leaders) are selected based on the amount of ADA they have staked, rather than solving complex computational puzzles. Validators propose and validate blocks, which are added to the blockchain.
2. Epochs and Slot Leaders: Cardano divides time into epochs (fixed time periods), each of which is subdivided into slots. Slot leaders are selected for each slot to validate and propose blocks. Slot leaders are chosen randomly based on the amount of ADA staked. More stake increases the probability of being selected. Validators are responsible for confirming transactions during their slot and passing the block to the next slot leader.
3. Delegation and Staking Pools: ADA holders can delegate their tokens to staking pools, which increases the pool's chances of being selected to validate a block. The pool operator and delegators share the rewards based on their stakes. This system ensures that participants who do not want to operate a full validator node can still earn rewards and contribute to network security by supporting trusted staking pools.
4. Security and Adversary Resistance: Ouroboros ensures security even in the presence of potential attacks. It assumes that adversaries may attempt to propagate alternative chains or send arbitrary messages. The protocol is secure as long as more than 51% of the staked ADA is controlled by honest participants. Settlement Delay: To protect against adversarial attacks, the new slot leader must consider the last few blocks as transient. Only the blocks preceding these are treated as finalized, ensuring that chain finality is secure against manipulation attempts. This mechanism also allows participants to temporarily go offline and resynchronize as long as they are not disconnected for more than the settlement delay period.

5. Chain Selection: Cardano's nodes adopt the longest valid chain rule: each node stores a local copy of the blockchain and replaces it with any discovered valid, longer chain. This ensures that all nodes eventually converge on a single version of the blockchain, maintaining network consistency.

S.5 Incentive Mechanisms and Applicable Fees

Cardano uses incentive mechanisms to ensure network security and decentralization through staking rewards, slashing mechanisms, and transaction fees.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   - Validators, known as slot leaders, secure the network by validating transactions and creating new blocks. To participate, validators must stake ADA, and those with larger stakes are more likely to be selected as slot leaders.
   - Validators are rewarded with newly minted ADA and transaction fees for successfully producing blocks and validating transactions.
   - Delegators, who may not wish to run a validator node, can delegate their ADA to staking pools. By doing so, they contribute to the network's security and earn a share of the rewards earned by the pool. The rewards are distributed proportionally based on the amount of ADA delegated.
2. Slashing Mechanism:
   - To prevent malicious behavior, Cardano employs a slashing mechanism. Validators who act dishonestly, fail to validate transactions properly, or produce incorrect blocks face penalties that involve the slashing of a portion of their staked ADA.
   - This provides strong economic incentives for validators to act honestly and ensures the network's integrity and security.
3. Delegation and Pool Operation:
   - Staking pools can charge operation fees (a margin on rewards) to maintain their infrastructure. This includes fixed costs set by pool operators. Delegators earn rewards after pool fees are deducted, providing a balanced incentive for both operators and delegators to participate actively.
   - Rewards are distributed at the end of each epoch, where staking pool performance and participation determine the distribution of ADA rewards to all stakeholders.

Applicable Fees:

1. Transaction Fees:
   - Transaction fees on Cardano are paid in ADA and are generally low. They are calculated based on the size of the transaction and the network's current demand. These fees are paid to validators for including transactions in new blocks.
   - The fee formula is: $a + b \times size$, where a is a constant (typically 0.155381 ADA), b is a coefficient related to the transaction size (0.000043946 ADA/byte), and size refers to the transaction size in bytes. This ensures that the fee adapts based on network load and the size of each transaction.
2. Staking Pool Fees:
   - Staking pool operators charge operational costs and a margin fee, which covers the cost of running and maintaining the staking pool. These fees vary between pools but ensure that operators can continue to provide their services while offering rewards to delegators.
   - After the operator's fee, the remaining rewards are distributed among the delegators based on the size of their stake.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) cardano is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Dymension

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Dymension	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	65891.35204	kWh/a

Qualitative information

S.4 Consensus Mechanism

Dymension is present on the following networks: Dymension, Osmosis.

Dymension utilizes a modular consensus architecture by combining a tendermint Proof-of-Stake algorithm with modular rollups, designed for scalability and interoperability, ensuring secure and efficient transaction processing across its ecosystem.

Core Components:

- Tendermint Core and Proof of Stake (PoS):

Dymension is built on the Tendermint Core consensus engine, leveraging its Byzantine Fault Tolerance (BFT) properties to ensure network security and resilience against malicious actors. Validators are selected based on their stake in DYM tokens, with higher stakes increasing the likelihood of participating in block production and validation.

- Modular Rollup Framework:

Dymension integrates rollups to process transactions off-chain, which are then submitted to the main chain for finalization. This modular approach enhances scalability and reduces congestion on the primary network.

- Interoperability via IBC:

The network employs the Inter-Blockchain Communication (IBC) protocol to enable seamless data and asset transfers between Dymension and other Cosmos-based blockchains.

- Fast Finality:

Blocks achieve instant finality once validated, reducing confirmation times and ensuring a consistent and efficient user experience.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Dymension is present on the following networks: Dymension, Osmosis.

Dymension's incentive structure and fee model are designed to align stakeholder interests, support network security, and maintain scalability across its rollup framework.

Incentive Mechanism:

- Staking Rewards: Validators earn rewards in DYM tokens for participating in consensus by validating transactions and securing the network. Delegators, who stake their DYM tokens with validators, also receive a share of these rewards, incentivizing broad participation in staking. Rollup Operators: Rollup operators who process transactions off-chain earn fees for their services, encouraging efficient execution and off-chain scalability.
- Governance Participation: Stakers and validators actively participate in governance decisions, such as protocol upgrades and parameter adjustments, reinforcing decentralized decision-making.
- Slashing Penalties: Validators who act maliciously or fail to meet performance requirements face slashing penalties, losing a portion of their staked tokens. This ensures accountability and network reliability.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in DYM tokens for activities such as transferring assets, interacting with dApps, and executing rollup transactions.

- Dynamic Fee Adjustment: The fee structure adjusts based on network usage and transaction complexity, balancing affordability with efficient resource allocation.
- Rollup Execution Fees: Fees are levied for transactions processed on rollups, compensating rollup operators and ensuring the economic sustainability of the off-chain execution layer.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Moonbeam

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Moonbeam	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	65700.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Moonbeam employs a Delegated Proof of Stake (DPoS) consensus mechanism combined with the Polkadot relay chain for enhanced scalability, finality, and security. It utilizes collators and validators, with finality provided by the GRANDPA finality gadget, ensuring deterministic block finality.

Key Features of Moonbeam's Consensus Mechanism:

1. Delegated Proof of Stake (DPoS):
   - Collators and Validators: In Moonbeam's DPoS system, collators maintain the parachain by collecting transactions from users and producing state transition proofs. The collator set is chosen based on the stake they have, including delegated stake. Delegation: Token holders can delegate their stake to collator candidates. The top collator candidates, including those with delegated stake, join the active set. Collators in the active set are randomly selected to produce blocks.
   - Stakes and Block Production: Once a collator is in the active set, their total stake does not impact their chance of being selected to produce blocks.
2. Polkadot Relay Chain Integration:
   Moonbeam is built as a parachain on Polkadot, which provides shared security, scalability, and consensus. The relay chain validators ensure that Moonbeam's blocks are validated and secured.
3. GRANDPA Finality:
   - Deterministic Finality: Moonbeam relies on Polkadot's GRANDPA finality gadget, which provides fast and deterministic finality for transactions. When a block is finalized, it cannot be reverted except through on-chain governance or forking.
   - Parallel Finality: The finality process in Moonbeam occurs simultaneously with block production, unlike Ethereum, which has slower finality. GRANDPA allows for the quick confirmation of blocks, often within a single block on Moonbeam.

4. Block Production:
   Blocks are produced by collators who are selected based on their stake and delegated stake, contributing to the network's decentralized nature.

S.5 Incentive Mechanisms and Applicable Fees

Moonbeam incentivizes participation through staking rewards for collators and token holders, alongside transaction fees.

Incentive Mechanism:

1. Collator Rewards:
   - Block Rewards: Collators are rewarded with newly minted tokens for successfully producing and validating blocks. These rewards are distributed proportionally to the collators in the active set.
   - Transaction Fees: Collators also earn transaction fees from the transactions included in the blocks they produce. These fees are paid by users to prioritize their transactions.
2. Delegation Rewards:
   - Delegated Stake: Token holders can delegate their stake to collator candidates. By doing so, they share in the rewards earned by the collators to whom they delegate their tokens. This incentivizes the broader community to participate in governance and block production.
   - Voting Power: Token holders who delegate their stake to collators help secure the network and participate in the selection of active collators.
3. Governance Participation:
   Voting on Network Proposals: Moonbeam uses its native tokens to allow participants to vote on governance proposals, helping to influence the future direction of the network and incentivizing active involvement in network management.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Transaction fees on Moonbeam are determined based on the complexity and size of the transaction. Users pay these fees in the native token (GLMR), which are distributed to the collators.
   - Fee Distribution: The fees are split between collators, incentivizing them to process transactions efficiently. The amount of transaction fees can vary depending on network congestion and the size of the transaction.
2. Staking Fees:
   Collator Staking: Collators must stake a certain amount of tokens to be eligible for block production. They are incentivized with staking rewards and transaction fees for ensuring the network's security and functionality.
3. Governance Fees:
   Voting Fees: Users may need to pay small fees to participate in governance, such as proposing changes or voting on proposals. These fees ensure governance is utilized effectively and prevents spam on the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to

the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, polkadot, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Osmosis



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Osmosis	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	65180.91744	kWh/a

Qualitative information

S.4 Consensus Mechanism

Osmosis is present on the following networks: Cosmos, Osmosis.

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
   - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.
   - Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.
2. Modular Cosmos SDK Framework:
   - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.

- Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Osmosis is present on the following networks: Cosmos, Osmosis.

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.
2. Slashing for Accountability:
   Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:
   User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.
2. Customizable Fee Model:
   Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.

- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) cosmos, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

constellation

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/

Field	Value	Unit
S.3 Name of the crypto-asset	constellation	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	63334.96839	kWh/a

Qualitative information

S.4 Consensus Mechanism

constellation is present on the following networks: Base, Constellation.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Constellation employs a layered consensus architecture. Local validation (L1 consensus) occurs across small validator clusters that validate DAG transactions and metagraph-specific updates. Final consensus (L0) is performed at both the metagraph level and the global Hypergraph level, with designated validator nodes staking DAG collateral to review and sign finalized snapshots of network state.

S.5 Incentive Mechanisms and Applicable Fees

constellation is present on the following networks: Base, Constellation.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These

assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Story

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Story	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	59130.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Story Blockchain network uses the CometBFT consensus mechanism, which is known for its high performance, scalability, and security and has been proven in the Cosmos ecosystem. CometBFT enables fast block times and instant finality, which is crucial for intellectual property applications.

The network architecture combines the Cosmos SDK for the consensus layer with a modified version of the Geth client as the execution layer to ensure full EVM compatibility. This modular structure allows for seamless integration of new modules and features while optimizing network performance.

S.5 Incentive Mechanisms and Applicable Fees

In the Story network, validators and delegators are incentivized through a structured staking model. Validators, responsible for block production and transaction validation, receive block rewards consisting of newly issued tokens and transaction fees. Delegators can delegate their tokens to validators and in return receive a share of the rewards proportional to their stake. The network supports both flexible and fixed staking periods, with longer lock-in periods offering higher reward multipliers.

Transaction fees follow the EIP-1559 model, in which a base amount is burned, resulting in a deflationary effect. This economic design aims to encourage active participation while ensuring the long-term sustainability of the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Mantle

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Mantle	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	53483.09105	kWh/a

Qualitative information

S.4 Consensus Mechanism

Mantle is present on the following networks: Ethereum, Mantle.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Mantle is a Layer-2 rollup built on top of Ethereum, designed to leverage Ethereum's security and Proof-of-Stake (PoS) consensus without an independent consensus layer.

Core Components of Mantle's Consensus:

1. Ethereum PoS Inheritance:
   Layer-2 Rollup Model: Mantle does not operate its own consensus mechanism; instead, it relies on Ethereum's PoS for transaction finalization and network security. As a rollup on Ethereum, Mantle inherits the security guarantees of Ethereum's established PoS model.
2. Rollup Type Options:
   Optimistic Rollups or Zero-Knowledge Rollups: Depending on its configuration, Mantle may use either Optimistic Rollups or Zero-Knowledge Rollups (zk-Rollups) to batch transactions. These rollup methods allow Mantle to achieve efficient off-chain processing and on-chain finality by periodically committing transaction data to Ethereum's mainnet.

S.5 Incentive Mechanisms and Applicable Fees

Mantle is present on the following networks: Ethereum, Mantle.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Mantle aims to reduce transaction fees for users by utilizing Ethereum compatibility, rollup technology, and transaction bundling, offering a cost-effective Layer-2 solution.

Incentive Mechanisms:

1. Gas Fee Model:
   Ethereum Compatibility: Mantle is EVM-compatible, meaning it shares Ethereum's gas fee model. Transactions require users to pay fees in units of gas, with costs varying based on transaction complexity and computational demand.
2. Lower Transaction Costs:
   - Off-Chain Processing with Bundling: By processing transactions off-chain and settling data on Ethereum only periodically, Mantle reduces individual transaction costs. This method results in significantly lower fees compared to the Ethereum mainnet.
   - Economies of Scale: Through transaction bundling, Mantle can spread the cost of Ethereum's on-chain settlement across multiple transactions, allowing users to pay only a fraction of the gas fees they would incur directly on Ethereum.

Applicable Fees:

Layer-2 Gas Fees: While Mantle's gas fees are lower than those on Ethereum, they are still measured in units of gas and depend on transaction complexity. The fees reflect the cost of executing transactions in Mantle's Layer-2 environment while benefiting from reduced overall gas consumption due to batching.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Monad

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Monad	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	53348.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Monad uses a custom Byzantine Fault Tolerant protocol called MonadBFT to achieve network-wide agreement on transaction ordering and block proposals. Consensus proceeds with asynchronous coordination across validators, decoupling transaction execution from block ordering to increase throughput.

S.5 Incentive Mechanisms and Applicable Fees

The native token MON is used to pay network transaction (gas) fees, which compensate validators for including and processing transactions.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Stellar Lumen

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Stellar Lumen	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	52560.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Stellar uses a unique consensus mechanism known as the Stellar Consensus Protocol (SCP).

Core Concepts:

1. Federated Byzantine Agreement (FBA):
   - SCP is built on the principles of Federated Byzantine Agreement (FBA), which allows decentralized, leaderless consensus without the need for a closed system of trusted participants.
   - Quorum Slices: Each node in the network selects a set of other nodes (quorum slice) that it trusts. Consensus is achieved when these slices overlap and collectively agree on the transaction state.
2. Nodes and Validators:
   - Nodes: Nodes running the Stellar software participate in the network by validating transactions and maintaining the ledger.
   - Validators: Nodes that are responsible for validating transactions and reaching consensus on the state of the ledger. Consensus Process
3. Transaction Validation:
   Transactions are submitted to the network and nodes validate them based on predetermined rules, such as sufficient balances and valid signatures.
4. Nomination Phase:
   - Nomination: Nodes nominate values (proposed transactions) that they believe should be included in the next ledger. Nodes communicate their nominations to their quorum slices.
   - Agreement on Nominations: Nodes vote on the nominated values, and through a process of voting and federated agreement, a set of candidate values emerges. This phase continues until nodes agree on a single value or a set of values.
5. Ballot Protocol (Voting and Acceptance): Balloting:
   - The agreed-upon values from the nomination phase are then put into ballots. Each ballot goes through multiple rounds of voting, where nodes vote to either accept or reject the proposed values.

- Federated Voting: Nodes exchange votes within their quorum slices, and if a value receives sufficient votes across overlapping slices, it moves to the next stage.
- Acceptance and Confirmation: If a value gathers enough votes through multiple stages (prepare, confirm, externalize), it is accepted and externalized as the next state of the ledger.

6. Ledger Update:
   Once consensus is reached, the new transactions are recorded in the ledger. Nodes update their copies of the ledger to reflect the new state. Security and Economic Incentives
7. Trust and Quorum Slices:
   Nodes are free to choose their own quorum slices, which provides flexibility and decentralization. The overlapping nature of quorum slices ensures that the network can reach consensus even if some nodes are faulty or malicious.
8. Stability and Security:
   SCP ensures that the network can achieve consensus efficiently without relying on energy-intensive mining processes. This makes it environmentally friendly and suitable for high-throughput applications.
9. Incentive Mechanisms:
   Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, the network incentivizes participation through the intrinsic value of maintaining a secure, efficient, and reliable payment network.

S.5 Incentive Mechanisms and Applicable Fees

Stellar's consensus mechanism, the Stellar Consensus Protocol (SCP), is designed to achieve decentralized and secure transaction validation through a federated Byzantine agreement (FBA) model. Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, it ensures network security and transaction validation through intrinsic network mechanisms and transaction fees.

Incentive Mechanisms:

1. Quorum Slices and Trust:
   - Quorum Slices: Each node in the Stellar network selects other nodes it trusts to form a quorum slice. Consensus is achieved through the intersection of these slices, creating a robust and decentralized trust network.
   - Federated Voting: Nodes communicate their votes within their quorum slices, and through multiple rounds of federated voting, they agree on the transaction state. This process ensures that even if some nodes are compromised, the network can still achieve consensus securely.
2. Intrinsic Value and Participation:
   - Network Value: The intrinsic value of participating in a secure, efficient, and reliable payment network incentivizes nodes to act honestly and maintain network security. Organizations and individuals running nodes benefit from the network's functionality and the ability to facilitate transactions.
   - Decentralization: By allowing nodes to choose their own quorum slices, Stellar promotes decentralization, reducing the risk of central points of failure and making the network more resilient to attacks. Fees on the Stellar Blockchain
3. Transaction Fees:
   - Flat Fee Structure: Each transaction on the Stellar network incurs a flat fee of 0.00001 XLM (known as a base fee). This low and predictable fee structure makes Stellar suitable for micropayments and high-volume transactions.
   - Spam Prevention: The transaction fee serves as a deterrent against spam attacks. By requiring a small fee for each transaction, Stellar ensures that the network remains efficient and that resources are not wasted on processing malicious or frivolous transactions.

4. Operational Costs:
   Minimal Fees: The minimal transaction fees on Stellar not only prevent spam but also cover the operational costs of running the network. This ensures that the network can sustain itself without placing a significant financial burden on users.
5. Reserve Requirements:
   - Account Reserves: To create a new account on the Stellar network, a minimum balance of 1 XLM is required. This reserve requirement prevents the creation of an excessive number of accounts, further protecting the network from spam and ensuring efficient resource usage.
   - Trustline and Offer Reserves: Additional reserve requirements exist for creating trustlines and offers on the Stellar decentralized exchange (DEX). These reserves help maintain network integrity and prevent abuse.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Acala

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Acala	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	52560.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Acala operates as a parachain within the Polkadot ecosystem, leveraging Polkadot's shared security model. Acala utilizes collators to aggregate transactions and produce blocks, which are then validated by the Polkadot relay chain validators.

S.5 Incentive Mechanisms and Applicable Fees

The native token of the Acala Network, ACA, serves multiple roles, including transaction fee payments, staking, and governance participation. ACA holders can stake their tokens to secure the network and earn rewards.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, polkadot, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

initia

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	initia	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	40602.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Initia is a Layer 1 blockchain built using the Cosmos SDK and CometBFT consensus engine. It operates under a Proof-of-Stake model, where validators are responsible for block production and finality based on the amount of INIT tokens bonded to them.

S.5 Incentive Mechanisms and Applicable Fees

The INIT token is used for transaction fees, staking, and governance within the Initia ecosystem. Participants receive staking rewards based on their contributions.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Concordium

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Concordium	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	40208.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Concordium is a public and permissionless blockchain that employs a Layered Proof-of-Stake (PoS) consensus mechanism combined with a Byzantine Fault Tolerance (BFT) protocol for enhanced security and finality.

Core Components:

1. Layered PoS Structure:
   - Proof-of-Stake for Block Production: Concordium uses PoS where users, known as validators, stake their tokens to participate in block creation and validation. Each validator's chances of being selected as the block producer (leader) depend on their staked amount, promoting fair participation.
   - Two-Layer Structure: Concordium separates block production and finalization into two distinct layers to increase security and reduce forks:
     - Block Production Layer: Responsible for creating new blocks and proposing them to the network.
     - Finalization Layer: Ensures blocks are finalized using a BFT protocol, making them irreversible once confirmed.
2. Finalization Layer (BFT Protocol):
   - Byzantine Fault Tolerance: The finalization layer uses a BFT protocol to validate and finalize blocks, ensuring they cannot be altered once added. This layer provides extra security by minimizing the potential for forks, as finalized blocks are definitive.
   - Finalization Committee: A subset of bakers (validators) is chosen as the finalization committee, whose members, known as finalizers, handle the finalization of blocks. This guarantees that confirmed blocks achieve consensus and permanence.
3. Identity-Based Anonymity:
   - Identity Verification: Concordium introduces an identity layer that verifies participant identities while maintaining user anonymity. This approach balances regulatory compliance and privacy, ensuring participants are pseudonymous but verifiable.
   - Sybil Attack Resistance: The combination of PoS and identity verification reduces the risk of Sybil attacks, as participants must have verified identities to contribute to consensus.
4. Leader Selection and Epochs:
   - Leader Selection: In each epoch, a specific baker (validator) is chosen as the leader, responsible for producing blocks. Leader selection uses a random nonce to ensure fairness and unpredictability.
   - Epochs: Each epoch lasts one hour, with fixed bakers for the duration. Leader selection within the epoch is based on each baker's relative stake, providing proportional chances for leader selection.

S.5 Incentive Mechanisms and Applicable Fees

Concordium incentivizes network security, participation, and governance through staking rewards, transaction fees, and a dynamic minting model.

Incentive Mechanisms:

1. Validator Rewards:
   - Transaction Fees and Staking Rewards: Validators who contribute to block creation and verification receive transaction fees and staking rewards. This incentivizes validators to uphold network security and stability.

- Baker and Finalizer Rewards: Concordium distributes rewards between bakers (validators creating blocks) and finalizers (validators finalizing blocks). Bakers receive the majority of rewards for their role in block production.

2. Staking Rewards:
   - Proportional Rewards: Validators earn rewards based on the size of their stake, encouraging users to participate in staking and network activities. The more CCD tokens staked, the higher the staking reward.
   - Governance Participation: By staking, users gain influence in network governance, including protocol upgrades and policy changes. This mechanism aligns validators' interests with the platform's long-term goals.
3. Minting Process and Distribution:
   - Daily Minting of CCD Tokens: Concordium mints new CCD tokens daily. This minting rate is governed by preset parameters to control the supply of CCD and ensure a sustainable ecosystem.
   - Distribution Model: 10% of newly minted CCD is allocated to the Concordium Foundation as a Platform Development Charge to support development.
   - 90% is divided as follows: Baker Rewards: 85% of the 90% is allocated to bakers for their role in block production. Finalizer Rewards: 5% of the 90% is allocated to finalizers, incentivizing their contribution to securing block finality.

Applicable Fees:

- Transaction fees on Concordium vary based on network demand and capacity, adjusting dynamically to ensure sustainable operations.
- Revenue for Validators: Collected fees are used to compensate validators, motivating them to process transactions accurately and efficiently.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

babylon

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	babylon	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	40208.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Babylon is a Cosmos SDK-based blockchain that utilizes a Tendermint-style Byzantine Fault Tolerant (BFT) Proof-of-Stake consensus mechanism. Validators are selected based on the amount of BABY tokens staked, and are responsible for proposing and validating new blocks in a round-robin process. Finality is achieved after a fixed number of confirmations, and slashing conditions are in place to penalize faulty or malicious validator behavior.

S.5 Incentive Mechanisms and Applicable Fees

Babylon uses the native BABY token to incentivize network participation and governance. Validators earn rewards for securing the network by validating transactions and producing blocks, with rewards consisting of transaction fees and newly minted tokens.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

VeChain

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	VeChain	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	39946.57141	kWh/a

Qualitative information

S.4 Consensus Mechanism

VeChain is present on the following networks: Binance Smart Chain, Vechain.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously.

Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

VeChain employs a Proof of Authority (PoA) 2.0 consensus mechanism, where trusted Authority Masternodes are responsible for validating transactions, providing both security and efficiency for enterprise applications.

Core Components of VeChain's Consensus:

1. Proof of Authority (PoA) 2.0:
   Trusted Authority Masternodes: VeChain's PoA 2.0 relies on a set of pre-approved Authority Masternodes to validate blocks and confirm transactions. These nodes are selected based on their reputation and reliability, ensuring network integrity and trustworthiness.
2. Finality and Security:
   Immediate Transaction Finality: Once a block is validated under PoA 2.0, it is final, reducing the likelihood of forks. This immediate finality enhances the security and reliability of the network, making it suitable for enterprise-grade applications.

S.5 Incentive Mechanisms and Applicable Fees

VeChain is present on the following networks: Binance Smart Chain, Vechain.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

VeChain's incentive model utilizes a dual-token system to support staking, transaction processing, and economic stability, helping to ensure predictable costs for network users.

Incentive Mechanisms:

1. Dual-Token Model:
   - VET (VeChain Token): VET is used primarily for value transfer and staking on the network. VET holders can stake their tokens to generate VTHO, which serves as "gas" for transactions.
   - VTHO (VeThor Token): VTHO is used to pay for transaction fees, providing a buffer against fluctuations in VET's market price. This setup decouples transaction costs from VET's volatility, allowing for stable and predictable transaction fees.
2. Staking Rewards:
   VET Staking to Generate VTHO: By staking VET, holders automatically generate VTHO tokens, which can be used to cover transaction costs. This staking mechanism incentivizes VET holders to participate in the network and secure its operations.

Applicable Fees:

Transaction Fees in VTHO: Transaction fees on VeChain are paid in VTHO, keeping costs stable and predictable for users regardless of VET's market price. This predictable fee model makes the network appealing for enterprises and high-volume applications.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Xion

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Xion	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	39814.20000	kWh/a

Qualitative information

S.4 Consensus Mechanism

XION uses a Tendermint-based Proof-of-Stake (PoS) consensus mechanism. Validators are responsible for securing the network and can be selected through token delegation. This setup supports decentralization while maintaining network integrity.

S.5 Incentive Mechanisms and Applicable Fees

Transaction fees are paid in the native token and used to reduce token issuance by offsetting the need for additional minting. Rewards go to validators and delegators based on their participation, and governance rights allow token holders to vote on protocol decisions. Inflation is calculated based only on staked tokens.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Celo

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Celo	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	39420.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Celo is present on the following networks: Celo, Near Protocol.

Celo uses a Proof of Stake (PoS) consensus model, which supports a decentralized, community-driven approach to governance and network security.

Core Components of Celo's Consensus:

1. Proof of Stake (PoS):
   Validator Role: Validators are responsible for creating new blocks, validating transactions, and maintaining the security and integrity of the network. Validators are selected based on the amount of CELO tokens they hold and stake, incentivizing honest participation and network reliability.
2. Decentralized Governance:
   Community Voting: Governance on Celo is decentralized, allowing CELO token holders to vote on proposals and changes to the network. This community-driven approach ensures that token holders have a say in the network's development and strategic direction.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

S.5 Incentive Mechanisms and Applicable Fees

Celo is present on the following networks: Celo, Near Protocol.

Celo's incentive model rewards validators and prioritizes accessibility with minimal transaction fees, especially for cross-border payments, supporting a flexible and user-friendly ecosystem.

Incentive Mechanisms:

1. Validator Rewards:
   Transaction Fees and Newly Minted Tokens: Validators earn rewards from transaction fees as well as newly minted CELO tokens. This dual-source reward system provides a continuous financial incentive for validators to act honestly and secure the network.
2. Transaction Flexibility and Gas Price:
   - Gas Limit and Price Control: Each transaction specifies a maximum gas limit, ensuring that users are not excessively charged if a transaction fails. Users can also set a gas price to prioritize transactions, allowing faster processing for higher fees.
   - Payment Flexibility with Multiple Currencies: Unlike many blockchains, Celo allows transaction fees to be paid in various ERC-20 tokens, providing flexibility for users. This approach improves accessibility, especially for individuals with limited access to traditional banking.
3. Minimal Fee Structure for Accessibility:
   - Designed for Low-Cost Transactions: Celo's fee structure is intentionally minimal, particularly for cross-border payments, making it ideal for users who may not have traditional banking options. This focus on accessibility aligns with Celo's mission to bring blockchain technology to underserved communities.

Applicable Fees:

Transaction Fees: Fees are calculated based on gas usage, with a maximum gas limit set per transaction. This limit protects users from excessive costs, while the option to pay in multiple currencies enhances flexibility.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.
2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) celo, near_protocol is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using

empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

MANTRA

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	MANTRA	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	33579.39041	kWh/a

Qualitative information

S.4 Consensus Mechanism

MANTRA is present on the following networks: Base, Binance Smart Chain, Ethereum, Mantra Oma, Osmosis, Polygon.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

MANTRA Chain is a Layer 1 blockchain built using the Cosmos SDK and employs the Tendermint Byzantine Fault Tolerant (BFT) consensus mechanism. It operates under a Proof-of-Stake (PoS) model, where validators are selected based on the amount of OM tokens they stake.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.

- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

MANTRA is present on the following networks: Base, Binance Smart Chain, Ethereum, Mantra Oma, Osmosis, Polygon.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.

- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees

associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum, osmosis, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Lisk

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Lisk	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	32850.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Lisk employs a Delegated Proof of Stake (DPoS) consensus mechanism to maintain a balance between decentralization, security, and efficiency in block production and transaction validation.

Core Components of Lisk's Consensus:

1. Delegated Proof of Stake (DPoS):
   Community-Elected Delegates: Lisk operates with a fixed set of 101 active delegates, chosen by token holders through a voting process. Lisk holders vote for delegates by staking their LSK tokens, and the top 101 delegates with the highest votes are selected for block production and validation.
2. Block Production:
   Fair Rotational System: Active delegates take turns producing blocks at fixed intervals, ensuring fair participation and equal opportunity for all elected delegates. This rotation system promotes decentralization and prevents single entities from dominating block production.
3. Finality and Security:
   Reduced Fork Risk: The fixed number of reputable delegates provides a fast confirmation time for blocks and minimizes the likelihood of forks or attacks, enhancing overall network security and stability.

S.5 Incentive Mechanisms and Applicable Fees

Lisk's incentive model rewards both active delegates and token holders, ensuring secure and consistent network performance while managing inflation.

Incentive Mechanisms:

1. Rewards for Delegates:
   - Block Rewards: Delegates receive rewards in LSK tokens for producing blocks, incentivizing them to actively participate in securing and maintaining the network. This reward structure encourages reliable block production from the community-elected delegates.
   - Transaction Fees: Delegates also earn transaction fees paid in LSK tokens for each transaction they validate within blocks. This provides an additional source of income and incentivizes efficient transaction processing.
2. Voting Incentives for Token Holders:
   Supporting Reliable Delegates: Lisk token holders benefit indirectly by voting for trustworthy and stable delegates, as these delegates help secure the network. Token holders play an active role in network governance by supporting reliable participants.
3. Reward Reduction Over Time:
   Sustainable Token Economy: Lisk's block rewards decrease over time to control inflation and ensure the long-term sustainability of the token economy. This gradual reduction in rewards aligns with Lisk's goal of managing token supply and maintaining a healthy economic structure.

Applicable Fees:

1. Fixed Fee Structure:
   Predictable Transaction Costs: Lisk employs a fixed fee structure for standard transactions, providing users with predictability in transaction costs and making the network accessible and user-friendly.

2. Two-Cost Structure for Mainnet Transactions:
   Layer 2 Execution Fee and Layer 1 Data Fee: Every transaction on Lisk's Mainnet has two associated costs: an L2 execution fee and an L1 data fee. This dual-fee model aligns with Lisk's Layer 2 architecture and its reliance on Ethereum for security and data storage.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Secret

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Secret	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	31536.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Secret utilizes the Proof of Stake (PoS) consensus mechanism to secure its network, with an emphasis on privacy-preserving features. The blockchain is built on the Cosmos SDK, allowing it to interoperate with other blockchains while maintaining the ability to offer confidential transactions.

Key Features of Secret Blockchain's Consensus Mechanism:

1. Proof of Stake (PoS):
   Validators are selected to produce and validate blocks based on the number of SCRT tokens they stake. Stakers, also known as validators, secure the network by participating in the consensus process, ensuring transaction validation and block production. The greater the amount of SCRT tokens staked, the higher the chances of being selected to validate the next block.
2. Privacy by Default:
   Secret Network uses encryption and trusted execution environments (TEEs) to ensure that data is kept private. This is in contrast to most blockchains that publicly display all transaction data. The network supports private smart contracts, meaning that the details of transactions, including the sender, recipient, and amount, are confidential by default.
3. Validator and Delegator Structure:
   Validators in the network are responsible for producing blocks, validating transactions, and maintaining network security. Token holders who do not wish to operate their own validator node can delegate their SCRT tokens to a validator. Delegators share in the rewards of validators based on the amount of SCRT tokens they delegate.
4. Cosmos-SDK & Tendermint Core:
   The Cosmos-SDK and Tendermint Core provide the underlying infrastructure for Secret's PoS consensus. This enables fast finality and low-latency transaction processing, ensuring the network is both scalable and secure.

S.5 Incentive Mechanisms and Applicable Fees

Incentive Mechanism:

1. Validator Rewards:
   Validators are rewarded in SCRT tokens for producing blocks, validating transactions, and maintaining network security. These rewards are proportional to the amount of stake a validator holds. Validators are selected based on the amount of SCRT tokens staked, and the greater the stake, the higher the chances of being selected to validate the next block.
2. Delegator Rewards:
   Token holders who delegate their SCRT tokens to a validator receive a share of the rewards earned by that validator. The more SCRT a delegator contributes, the larger their share of the rewards. This incentivizes the broader community to participate in the network's staking process without needing to operate their own validator nodes.
3. Staking and Delegation:
   Staking is essential for network participation and security, and it is the primary mechanism through which both validators and delegators earn rewards. This staking model aligns participants' interests with the network's success and integrity. Validators and delegators are motivated to act honestly because they face slashing penalties if they fail to perform their duties correctly, such as participating in double-signing or other malicious activities.

Applicable Fees:

1. Transaction Fees:
   Users pay transaction fees in SCRT tokens to process transactions on the network. These fees are used to incentivize validators for validating and including transactions in blocks. Fees are determined dynamically based on network demand and transaction complexity. In periods of high congestion, users may need to pay higher fees for quicker transaction processing.
2. Smart Contract Fees:
   Secret supports private smart contracts, and users must pay fees for executing these contracts. These fees are also paid in SCRT tokens and are distributed to validators who process the

execution. The fees associated with smart contract execution are based on the resources consumed by the contract, including computational power and storage.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, cosmos, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

hydration

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	hydration	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	30747.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Hydration operates as a parachain within the Polkadot ecosystem, inheriting its consensus mechanism from Polkadot's relay chain.

S.5 Incentive Mechanisms and Applicable Fees

Hydration's native token, HDX, serves multiple roles within the network, including transaction fee payments and participation in governance decisions. The network implements a single-sided liquidity provisioning model through its Omnipool, allowing users to provide liquidity with a single asset.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Kinto

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Kinto	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	30222.00243	kWh/a

Qualitative information

S.4 Consensus Mechanism

Kinto is present on the following networks: Arbitrum, Kinto.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Kinto operates as an Ethereum Layer 2 network utilizing the Arbitrum Nitro stack, functioning as an optimistic rollup that settles transactions on the Ethereum mainnet.

S.5 Incentive Mechanisms and Applicable Fees

Kinto is present on the following networks: Arbitrum, Kinto.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.

- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The token, $K, serves multiple roles within the Kinto ecosystem, including governance participation and incentivization. The Kinto Network uses the native token $K to coordinate participation, governance, and resource allocation within its permissioned Layer 2 environment. Incentives are primarily distributed through the Kinto Mining Program, which rewards two categories of participants: users who provide capital to on-chain protocols and developers who build applications that attract and retain liquidity. Transaction fees are paid in ETH, consistent with the Arbitrum stack.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

u_two_u

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	u_two_u	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	28777.66395	kWh/a

Qualitative information

S.4 Consensus Mechanism

u_two_u is present on the following networks: Ethereum, U Two U.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The U2U Network uses an asynchronous Byzantine Fault Tolerant (aBFT) consensus combined with a Delegated Proof-of-Stake model. This structure enables validator participation through delegation while maintaining deterministic finality. Its protocol is built on a DAG-based architecture that processes transactions in parallel to increase throughput. The design focuses on predictable consensus execution and resilience against faulty nodes.

S.5 Incentive Mechanisms and Applicable Fees

u_two_u is present on the following networks: Ethereum, U Two U.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The network's incentive structure is based on staking and delegation, where validators and delegators receive protocol-defined rewards for contributing to consensus. Transaction fees are applied to network operations and are used to compensate validators and maintain system integrity. Fee levels and reward parameters are defined within the protocol and may be adjusted through governance. This mechanism aims to ensure stable network operation and alignment between participants and the protocol rules.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

zkVerify

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	zkVerify	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	28119.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

zkVerify uses a Tendermint-based Nominated Proof-of-Stake (nPoS) consensus model with a slot time of six seconds, epochs lasting one hour, and eras of six hours. Validators maintain block production and finalization, while the protocol supports a modular design for efficient state verification across chains.

S.5 Incentive Mechanisms and Applicable Fees

The native token (VFY) is used to pay for proof-verification services and transaction submissions. Validators stake VFY to secure the network and earn rewards. The fee market uses an adaptive structure, dynamically adjusting for network demand, and reward mechanisms align validator incentives and governance participation.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Wrapped BTC

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Wrapped BTC	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	27322.18968	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

THORChain

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	THORChain	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	26805.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

THORChain utilizes the Tendermint Byzantine Fault Tolerant (BFT) consensus protocol combined with Proof of Stake (PoS), where validator nodes stake RUNE to secure the network.

Core Components of THORChain's Consensus:

1. Tendermint Consensus Protocol:
   THORChain uses the Tendermint consensus protocol, a BFT algorithm that enables high-speed and secure consensus across distributed nodes. This protocol is designed to achieve consensus even if some validators behave maliciously, as long as a majority act honestly.
2. Proof of Stake (PoS) Mechanism:
   - Staking Requirements: Validator nodes are required to stake RUNE, the native token of THORChain, to participate in the consensus process. Staking serves as collateral, incentivizing validators to act honestly and discouraging malicious behavior through economic penalties.
   - Validator Rotation: THORChain regularly rotates its validators, ensuring that only the most actively engaged and well-staked nodes maintain validator status. This competitive environment encourages decentralization, as nodes must continuously stake RUNE to secure a spot in the validator set.
3. Slashing for Security:
   Validators can be penalized (slashed) if they fail to fulfill their responsibilities or act dishonestly. Slashing serves as a deterrent against malicious behavior, ensuring validators remain reliable and maintain the integrity of the network.

S.5 Incentive Mechanisms and Applicable Fees

THORChain employs staking rewards, transaction fees, and slashing penalties to maintain security and incentivize validator participation.

Incentive Mechanisms:

1. Staking Rewards:
   Validators earn staking rewards for participating in network security and consensus. These rewards are paid in RUNE, THORChain's native token, and are proportional to the amount staked. This incentivizes nodes to lock up RUNE and remain active in the network.
2. Transaction Fees:
   Validators also earn a portion of the transaction fees generated within the network. These fees are distributed among validators as additional rewards, providing an ongoing incentive to process transactions efficiently.
3. Decentralization through Node Rotation:
   The regular rotation of validator nodes means that participants must continuously compete for positions by staking RUNE. This mechanism enhances network security and promotes decentralization, preventing any single entity from dominating the network.
4. Slashing Mechanism:
   To maintain network integrity, THORChain employs a slashing mechanism, penalizing validators that act maliciously or fail to meet their responsibilities. This encourages validators to act in the network's best interest.

Applicable Fees:

Transaction fees on THORChain are paid in RUNE and vary based on network activity and transaction type. These fees help compensate validators and support the network's operational costs.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

JUNO



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	JUNO	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	26417.91744	kWh/a

Qualitative information

S.4 Consensus Mechanism

JUNO is present on the following networks: Juno, Osmosis.

Juno is a Cosmos SDK-based Layer 1 blockchain that uses the Tendermint Byzantine Fault Tolerant (BFT) consensus mechanism under a Proof-of-Stake model. Validators are selected based on delegated JUNO tokens to produce and finalize blocks.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

JUNO is present on the following networks: Juno, Osmosis.

Transaction fees are paid in JUNO and distributed among validators and their delegators. JUNO is also used for staking and governance, allowing holders to vote on network proposals.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Moonriver



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Moonriver	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	26280.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Moonriver operates on a Proof of Stake (PoS) consensus mechanism, enhanced by Polkadot's Nominated Proof of Stake (NPoS) model. This structure ensures secure, scalable, and decentralized transaction processing, leveraging the robust Substrate framework.

Core Components:

- Nominated Proof of Stake (NPoS):
  Validators are selected through staking by token holders, known as nominators, who delegate their MOVR tokens to trusted validator nodes. Validators with higher stakes and nominations are chosen to validate blocks and secure the network.
- Collator Nodes:
  Moonriver employs collator nodes, responsible for aggregating transactions into blocks and submitting them to the Polkadot Relay Chain for final validation. Collators ensure fast block production while relying on Polkadot's shared security.
- Byzantine Fault Tolerance (BFT):
  Moonriver integrates BFT properties to handle network disruptions and maintain consensus even if some validators act maliciously or become unavailable.
- Seamless Interoperability:
  As a parachain within the Polkadot ecosystem, Moonriver benefits from Polkadot's cross-chain messaging protocols, enabling secure and efficient interoperability with other parachains and external blockchains.

S.5 Incentive Mechanisms and Applicable Fees

Moonriver's incentive model ensures active participation from validators, nominators, and developers while maintaining network security and usability.

Incentive Mechanisms:

- Staking Rewards: Validators and nominators earn MOVR tokens for securing the network and validating transactions.
- Collator Rewards: Collators, who propose blocks, are rewarded with MOVR tokens.
- Inflationary Rewards: New MOVR tokens are minted to fund staking and ecosystem development.

- Developer Incentives: A portion of rewards supports dApp development and ecosystem growth.

Applicable Fees:

- Transaction Fees: Paid in MOVR for transfers and smart contract interactions, distributed to validators and collators.
- Gas Fees: Calculated based on transaction complexity, ensuring predictable costs.
- Fee Burning: A portion of fees is burned, reducing token supply over time to support value retention.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, kusama, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Zeta

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Zeta	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	25602.17968	kWh/a

Qualitative information

S.4 Consensus Mechanism

Zeta is present on the following networks: Ethereum, Zeta.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

ZetaChain is a Layer 1 blockchain built using the Cosmos SDK and employs the CometBFT consensus engine, a variant of Byzantine Fault Tolerant (BFT) consensus. It operates under a Proof-of-Stake (PoS) model, where validators are selected based on the amount of ZETA tokens they stake.

S.5 Incentive Mechanisms and Applicable Fees

Zeta is present on the following networks: Ethereum, Zeta.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The native token, ZETA, serves multiple functions within the ZetaChain ecosystem, including transaction fee payments, staking, and governance participation. Validators and delegators earn rewards in ZETA tokens for securing the network through staking.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital

Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Bittensor

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Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bittensor	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	25228.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Bittensor employs a Proof-of-Stake consensus mechanism tailored for integrating blockchain technology with decentralized AI, ensuring secure, efficient, and reliable contributions from its participants.

Proof of Stake (PoS) with Neural Consensus:

- Bittensor operates on a PoS consensus model, where validators are selected based on the amount of TAO tokens staked. Validators secure the network by producing and validating blocks, ensuring transaction integrity.
- Neural Consensus Integration: A unique feature of Bittensor is its neural consensus, which evaluates the quality of work performed by AI models on the network. Nodes are incentivized to

contribute meaningful computations for tasks like AI training, which are validated through peer review and network-wide voting.
- Dynamic Validator Selection: The network dynamically adjusts validator participation, prioritizing nodes that contribute both computational and staking resources effectively.
- Scalability and Security: The combined PoS and neural consensus model ensures scalability for AI-centric workloads while maintaining blockchain-level security.

S.5 Incentive Mechanisms and Applicable Fees

Bittensor incentivizes network participants through token rewards for securing the network and contributing to its AI capabilities, with a fee structure designed to sustain network operations and encourage participation.

Incentive Mechanism:

- TAO Rewards for Validators: Validators earn TAO tokens as rewards for securing the network, validating transactions, and maintaining blockchain integrity. Rewards are distributed based on the validator's staked TAO tokens and performance in the consensus process.
- AI Contribution Rewards: Nodes contributing to the network's AI computations (e.g., training models) are rewarded in TAO tokens. Rewards are determined by the quality and relevance of contributions, as evaluated through the neural consensus mechanism.
- Delegation Rewards: TAO holders who delegate their tokens to validators earn a share of staking rewards, encouraging broader participation in network security and governance.
- Dynamic Incentive Structure: Rewards are dynamically allocated based on network activity and AI workloads, promoting sustained contribution and high-quality participation.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in TAO tokens for processing transactions on the network. Fees are distributed to validators as additional compensation.
- AI Service Fees: Applications utilizing Bittensor's AI services pay fees in TAO tokens, incentivizing nodes to perform computations and contribute resources.
- Low-Cost Fee Model: The network employs a cost-efficient fee structure to attract developers and users while ensuring sustainability for validators and contributors.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

PEAQ

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	PEAQ	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	24966.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The peaq blockchain operates on a modified version of the Nominated Proof of Stake (NPoS) consensus mechanism. In this system, validators are responsible for block production and transaction validation, while nominators support trustworthy validators by staking their tokens.

The mechanism is designed to balance decentralization and performance, selecting validators based on their stake and reputation. It emphasizes security and scalability, ensuring resistance to malicious actors while maintaining high throughput.

S.5 Incentive Mechanisms and Applicable Fees

peaq's economic model is tailored to support the machine economy through its native tokens, $PEAQ and $MINT. Validators and nominators earn rewards for their contributions to network security and operations, incentivizing active participation in the consensus process. The network also rewards users and devices participating in machine-driven ecosystems, fostering innovation and engagement.

Transaction fees are designed to be minimal, enabling seamless microtransactions and accessibility for various use cases.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The

information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Chiliz

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Chiliz	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	23299.50197	kWh/a

Qualitative information

S.4 Consensus Mechanism

Chiliz is present on the following networks: Chiliz, Ethereum.

The Chiliz Chain operates on a Proof of Staked Authority (PoSA) consensus model, a hybrid that combines Proof of Stake (PoS) and Proof of Authority (PoA) to secure the network through both economic and reputational incentives.

Core Components:

- Proof of Staked Authority (PoSA) Validator Selection: Validators are selected based on their stake of CHZ tokens and their reputation within the network, enhancing security and trustworthiness.
- Collateral Requirement: Validators must lock a portion of CHZ as collateral, which can be slashed if they act maliciously or fail to meet network standards, ensuring alignment with network security.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Chiliz is present on the following networks: Chiliz, Ethereum.

Chiliz incentivizes validators and delegators to contribute to network security through rewards and transaction fees in CHZ.

Incentive Mechanisms:

- Staking Rewards Validator Rewards: Validators earn CHZ tokens for validating transactions and maintaining network integrity.
- Delegator Rewards: CHZ holders who delegate their tokens to validators share in staking rewards, allowing passive participation in network security.

Applicable Fees:

Transaction Fees CHZ-Based Fees: Transaction fees are paid in CHZ and are distributed to validators as additional compensation, supporting validator incentives and covering network operational costs.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally

Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Paxos Gold

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Paxos Gold	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	23023.88336	kWh/a

Qualitative information

S.4 Consensus Mechanism

Paxos Gold is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Paxos Gold is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

union

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	union	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	22352.32834	kWh/a

Qualitative information

S.4 Consensus Mechanism

union is present on the following networks: Binance Smart Chain, Ethereum, Union.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Union uses CometBLS, an enhanced version of the Tendermint BFT protocol optimized for zero-knowledge proofs and cross-chain interoperability. It incorporates BLS signature aggregation and combines elements from Cosmos and Polkadot to support efficient validator coordination across many chains and validators.

S.5 Incentive Mechanisms and Applicable Fees

union is present on the following networks: Binance Smart Chain, Ethereum, Union.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Union applies a dual-layer incentive system: validators earn block rewards and transaction fees based on delegated stake. The network features an adaptive fee model derived from EIP-1559, adjusting costs dynamically according to network demand, while enabling rewards for participants involved in proving, relaying, and governance across chains.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Nano XNO

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Nano XNO	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	21549.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Nano employs a unique consensus model called Open Representative Voting (ORV), a variant of delegated Proof of Stake (dPoS), and utilizes a block-lattice structure for high-speed, efficient transaction processing.

Core Components:

1. Open Representative Voting (ORV):
   - Representative Selection: Each Nano account holder can choose a representative to vote on their behalf in network consensus. Representatives are nodes with delegated voting power, which determines their influence in resolving transaction conflicts.
   - Fast, Low-Energy Voting: Representatives vote on the validity of transactions, achieving consensus without intensive mining or staking, which minimizes energy usage and allows for quick transaction finality.
2. Block-Lattice Structure:
   Each account has its own chain, allowing asynchronous updates, nearly instant transfers, and high scalability.
3. Spam Prevention:
   Senders perform a small PoW computation to initiate transactions, deterring spam while remaining lightweight for legitimate users.

S.5 Incentive Mechanisms and Applicable Fees

Nano's design allows for feeless transactions, emphasizing efficiency and accessibility without traditional financial incentives for validators.

Incentive Mechanisms:

Community and Organizational Incentives for Representatives:
Non-Financial Motivation: Representatives, often exchanges, businesses, or community members, participate in consensus to support the network's stability and growth rather than for direct financial rewards.

Applicable Fees:

1. Feeless Transactions:
   No Transaction Fees: Nano's architecture enables feeless transactions, allowing for high-frequency usage without cost to users.
2. Anti-Spam Measures:
   Small PoW for Transaction Initiation: Users perform a minimal PoW computation to prevent spam, ensuring network resources are reserved for legitimate transactions without imposing fees.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Metis Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Metis Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	21223.73854	kWh/a

Qualitative information

S.4 Consensus Mechanism

Metis Token is present on the following networks: Ethereum, Metis.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Metis is an Ethereum Layer-2 scaling solution that utilizes Optimistic Rollup technology to enhance transaction throughput and reduce costs. In this architecture, a sequencer is responsible for aggregating and submitting batches of transactions to the Ethereum mainnet. Metis is transitioning towards a decentralized sequencer model, incorporating a Proof of Stake (PoS) consensus layer based on Tendermint.

This model involves multiple sequencers participating in transaction processing, with roles assigned through a staking mechanism. The decentralized sequencer system is designed to prevent single points of failure and ensure continuous network uptime.

S.5 Incentive Mechanisms and Applicable Fees

Metis Token is present on the following networks: Ethereum, Metis.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Within the Metis ecosystem, users pay transaction fees in the form of METIS tokens for operations conducted on the Layer-2 network. These fees are distributed among sequencers and validators as rewards for their participation in processing transactions and maintaining network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is

also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, metis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Songbird

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Songbird	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	21024.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Songbird is a decentralized network designed to act as a canary network for the Flare blockchain, enabling the testing of features before they are deployed on the main network. It utilizes the Avalanche consensus mechanism, which combines elements of classical and Nakamoto-style consensus to achieve high throughput and low-latency finality.

S.5 Incentive Mechanisms and Applicable Fees

Songbird incentivizes network participants, particularly validators, by rewarding them with native tokens for securing the network and validating transactions. Validators earn rewards based on their contribution to the consensus process, which helps maintain the integrity and security of the network. Additionally, users can participate in staking to earn rewards, further supporting the network's operations. The fee structure on Songbird is designed to be low and efficient, with transaction fees paid by users for processing their transactions. These fees are used to incentivize validators, cover the operational costs of the network, and ensure the ongoing development and stability of the ecosystem.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

karura

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	karura	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	20498.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Karura is a parachain on the Kusama network and inherits its consensus mechanism from Kusama's relay chain.

S.5 Incentive Mechanisms and Applicable Fees

The native token of the network, KAR, is used for transaction fees, governance, and protocol operations. Users can participate in governance by voting on proposals with KAR. Fees on Karura follow Kusama's weight-based model and are paid in KAR.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

althea

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	althea	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	20104.20000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Althea L1 is a CosmosSDK/EVM-based blockchain secured by a standard Proof-of-Stake BFT consensus mechanism.

S.5 Incentive Mechanisms and Applicable Fees

Bandwidth providers ("routers") and operators earn stablecoin payments based on actual data usage, secured and settled on-chain. ALTHEA token stakers and delegators earn rewards from

these stablecoin transaction fees as well as inflation-based block rewards. A portion of each transaction fee is allocated to validators, while the remainder supports token holder incentives and governance participation via staking and proposal voting.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Shiden Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Shiden Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	20104.20000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Shiden operates as a parachain within the Kusama network. In this model, SDN token holders nominate validators responsible for block production and network security.

S.5 Incentive Mechanisms and Applicable Fees

The native token, SDN, serves multiple roles within the Shiden ecosystem. It is used for staking to support the NPoS consensus, paying transaction fees, and participating in governance decisions.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Boba Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Boba Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	19791.85308	kWh/a

Qualitative information

S.4 Consensus Mechanism

Boba Token is present on the following networks: Boba Network, Ethereum.

Boba Network operates as an Ethereum Layer 2 solution using an Optimistic Rollup architecture to improve scalability and reduce transaction costs.

Core Components:

- Optimistic Rollup: Processes transactions off-chain, aggregates them, and submits condensed proofs to the Ethereum mainnet for finalization.
- Sequencer Role: A sequencer organizes and bundles transactions off-chain before submitting the batched data to Ethereum. This enhances transaction throughput and reduces latency.
- Fraud Proofs: Maintains security by allowing users to challenge suspicious transactions. If a transaction is deemed fraudulent, it is corrected on the mainnet, ensuring integrity.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Boba Token is present on the following networks: Boba Network, Ethereum.

The Boba Network incentivizes participation and ensures affordability with flexible fee payment options and staking rewards.

Incentive Mechanisms:

- Staking Rewards: BOBA token holders can stake their tokens to participate in governance and earn staking rewards, encouraging long-term engagement and network growth.
- Sequencer Revenue: The sequencer earns fees for bundling and submitting transactions, incentivizing efficient network operation.

Applicable Fees:

- Dual-Fee Token System: Users can pay transaction fees in BOBA tokens or the base blockchain token (e.g., ETH), offering flexibility.
- Low Transaction Costs: By batching transactions off-chain, Boba significantly reduces the gas fees users pay compared to directly using the Ethereum mainnet.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The

energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

gunz

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	gunz	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	19739.90414	kWh/a

Qualitative information

S.4 Consensus Mechanism

gunz is present on the following networks: Avalanche, Gunz.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

GUNZ is a Layer-1 blockchain specifically designed for gaming, operating as an Avalanche subnet and utilizing the Snowman++ consensus protocol. This setup enables sub-second transaction finality and supports over 4,500 transactions per second, ensuring a seamless gaming experience. The network employs a permissioned model for smart contract deployment, allowing only authorized addresses to implement code, which enhances security and stability. Validators are represented by Validator NFTs, which are required to participate in the network's consensus process. These NFTs come in various rarities, each offering different levels of rewards and responsibilities within the network.

S.5 Incentive Mechanisms and Applicable Fees

gunz is present on the following networks: Avalanche, Gunz.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

The GUNZ ecosystem is powered by its native token, $GUN, which serves multiple functions including transaction fees, staking, and governance. Players use $GUN for various in-game transactions such as purchasing NFT items, customization options, and subscriptions. Validators earn $GUN rewards for processing transactions and decoding in-game items, with the amount of rewards influenced by the rarity of their Validator NFTs. Transaction fees within the network are paid in $GUN and are designed to be minimal to encourage user participation.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When

calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

zero_g

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	zero_g	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	18950.64692	kWh/a

Qualitative information

S.4 Consensus Mechanism

zero_g is present on the following networks: Binance Smart Chain, Ethereum, Zero G.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

0G Chain separates consensus and execution into modular layers. The network uses an optimized version of CometBFT (byzantine fault-tolerant Proof-of-Stake) for the consensus layer, with tuned parameters to support high throughput and sub-second finality. Validators stake the native token

and are selected via VRF (Verifiable Random Function) to produce blocks and participate in consensus.

S.5 Incentive Mechanisms and Applicable Fees

zero_g is present on the following networks: Binance Smart Chain, Ethereum, Zero G.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Validators receive rewards from block issuance and transaction fees paid in the network's native token. Users pay transaction (gas) fees in that token. A portion of collected fees is burned to introduce deflationary pressure, while the remainder is distributed to validators as compensation. Token holders can stake and delegate, thus earning rewards proportional to their participation and supporting network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Ab Chain

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ab Chain	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	18396.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Ab Chain is present on the following networks: Ab Core, Ab Iot, Binance Smart Chain.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.

6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Ab Chain is present on the following networks: Ab Core, Ab Iot, Binance Smart Chain.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the

Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

nodle

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	nodle	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	17843.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Nodle runs as a parachain on Polkadot and uses Polkadot's consensus. It uniquely integrates a "Proof of Connectivity" model, where smartphones act as edge nodes relaying IoT data via Bluetooth.

S.5 Incentive Mechanisms and Applicable Fees

Participants earn NODL tokens by contributing connectivity through their devices. Transaction fees are minimal and paid in NODL, with the token also used for governance.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based

on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Matchain

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Matchain	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	17607.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Matchain is present on the following networks: Matchain.

S.5 Incentive Mechanisms and Applicable Fees

The native token, MAT, is used for governance, access control, and executing campaigns within the ecosystem. Users can earn MAT through verified participation and by staking in dedicated pools. While transaction fees on the network are paid in BNB, MAT plays a central role in incentivizing contributions and supporting decentralized coordination mechanisms.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Movement

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Movement	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	16067.82060	kWh/a

Qualitative information

S.4 Consensus Mechanism

Movement is present on the following networks: Ethereum, Movement.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Movement is present on the following networks: Ethereum, Movement.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, movement is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

stride

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	stride	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	16030.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Stride is a liquid staking protocol within the Cosmos ecosystem that initially operated with its own validator set using the Tendermint Byzantine Fault Tolerant (BFT) consensus mechanism. In July 2023, Stride transitioned to Interchain Security (ICS), becoming a consumer chain secured by the Cosmos Hub.

S.5 Incentive Mechanisms and Applicable Fees

The native token of the Stride Network, STRD, is used for protocol governance, value capture, and community incentives. STRD holders can participate in on-chain governance, influencing decisions such as protocol upgrades and strategic direction.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

basilisk



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	basilisk	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13797.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Basilisk operates as a parachain within the Kusama network, utilizing the shared security model provided by Kusama's relay chain validators.

S.5 Incentive Mechanisms and Applicable Fees

Basilisk uses its native token, BSX, to facilitate core network functions such as transaction fee payments and governance.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

plasma

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	plasma	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13435.07596	kWh/a

Qualitative information

S.4 Consensus Mechanism

plasma is present on the following networks: Binance Smart Chain, Plasma.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Plasma Chain uses PlasmaBFT, a consensus protocol based on Fast HotStuff with pipelined execution. Validators are selected through a simplified Proof-of-Stake mechanism and participate in block production and finalization. Misbehavior does not lead to full slashing of stake but results in reduced rewards.

S.5 Incentive Mechanisms and Applicable Fees

plasma is present on the following networks: Binance Smart Chain, Plasma.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Validators receive a share of transaction fees and protocol rewards for signing blocks. If validators fail to participate correctly, their reward share is reduced. The protocol is designed to balance participation incentives while limiting financial penalties.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Astar

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Astar	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	13140.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Astar uses a hybrid consensus mechanism that combines Proof of Stake (PoS) and Delegated Proof of Stake (DPoS), with the added feature of Sharded Multichain capabilities. The primary goal is to provide a scalable, interoperable, and decentralized platform for building decentralized applications (dApps), which can run on multiple blockchains in parallel.

Key Features of Astar's Consensus Mechanism:

1. Proof of Stake (PoS): In Astar, validators participate by staking ASTR tokens, the native currency of the network. The more tokens staked, the higher the chances of being selected as a validator. Validators are responsible for validating transactions and securing the network. Validators receive block rewards for their efforts, which are paid in ASTR tokens.
2. Delegated Proof of Stake (DPoS): Astar incorporates DPoS to allow ASTR token holders to vote for validators. Token holders delegate their voting power to trusted validators, who then produce blocks and validate transactions. This ensures greater decentralization by allowing the community to have a direct say in who validates the network. Delegators receive a share of the block rewards earned by their selected validators.
3. Sharded Multichain: Astar's consensus mechanism allows for multichain execution via Parachains in the Polkadot ecosystem, enabling Astar to process multiple parallel chains and increase scalability. This sharding mechanism ensures that Astar can scale effectively, maintaining high throughput while decentralizing the network.
4. Finality: Astar leverages Polkadot's GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) finality gadget for fast and deterministic finality. Once a block is finalized, it is irreversible, ensuring the integrity and security of transactions.

S.5 Incentive Mechanisms and Applicable Fees

Astar incentivizes network participation through block rewards, transaction fees, and staking rewards while encouraging governance via delegated voting.

Incentive Mechanism:

1. Staking Rewards: Validators earn ASTR tokens for validating transactions and securing the network. The more tokens staked, the higher the chances of validating blocks.
2. Delegated Proof of Stake (DPoS): ASTR token holders can delegate their tokens to validators, sharing in the rewards based on the performance of their chosen validators.
3. Cross-Chain dApp Rewards: Developers deploying dApps on Astar earn rewards for using the network's multichain capabilities.
4. Governance Participation: ASTR token holders participate in on-chain governance to vote on proposals and protocol changes.

Applicable Fees:

1. Transaction Fees: Users pay fees in ASTR tokens for transactions. These are collected by validators who process the transactions.
2. dApp Execution Fees: Developers pay for smart contract execution based on resource demands.
3. Cross-Chain Fees: Additional fees apply for asset transfers and interactions between different blockchain networks.
4. Parachain Slot Fees: Astar incurs fees for its parachain slot on the Polkadot network to ensure interoperability.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, polkadot, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

analog

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	analog	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13009.09651	kWh/a

Qualitative information

S.4 Consensus Mechanism

analog is present on the following networks: Analog, Ethereum.

Analog operates as a Layer-0 blockchain protocol designed to facilitate interoperability across diverse blockchain networks. Its architecture is built upon the Substrate SDK, enabling modular development and integration capabilities. The core of Analog's consensus mechanism is the Proof-of-Time (PoT) protocol, which selects validators based on a combination of fixed staking amounts and a ranking score derived from their historical performance and reliability.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

analog is present on the following networks: Analog, Ethereum.

The native token of the Analog Network, ANLOG, serves multiple functions, including transaction fee payments, staking, and governance participation. Validators, referred to as Time Nodes, are rewarded with ANLOG tokens for their role in securing the network and validating transactions.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all

implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

altair 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	altair	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13008.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Altair operates as a parachain within the Kusama network, leveraging Kusama's shared security model. As a parachain, Altair benefits from the relay chain's validator set for consensus, ensuring interoperability and security within the Kusama ecosystem.

S.5 Incentive Mechanisms and Applicable Fees

The native token of the Altair network, AIR, serves multiple roles, including transaction fee payments, staking, and governance participation. Token holders can stake AIR to participate in the network's consensus mechanism by nominating validators, thereby contributing to network security. Stakers and validators receive rewards in AIR tokens, incentivizing active participation. Additionally, AIR tokens are used to pay transaction fees within the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we

update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

hashkey_chain

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	hashkey_chain	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	12128.94631	kWh/a

Qualitative information

S.4 Consensus Mechanism

hashkey_chain is present on the following networks: Ethereum, Hashkey Chain.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

HashKey Chain inherits its core consensus and data availability from Ethereum through the OP Stack framework. While the network maintains its own sequencing and infrastructure components, block finality ultimately depends on Ethereum as the settlement layer. The chain is fully EVM-compatible, enabling the deployment and execution of smart contracts written in Solidity and related languages.

S.5 Incentive Mechanisms and Applicable Fees

hashkey_chain is present on the following networks: Ethereum, Hashkey Chain.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

On HashKey Chain, transaction processing is incentivized through gas fees, which are denominated in HSK. Users pay gas fees when initiating transfers, deploying contracts, or interacting with decentralized applications. These fees are used to compensate network operators and sequencers that process and include transactions on the Layer-2 chain. In addition, the HashKey ecosystem provides reward mechanisms linked to trading activity, liquidity provision, and ecosystem participation. These rewards may include periodic distributions of HSK tokens or fee discounts on affiliated platforms such as HashKey Exchange.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Linea

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Linea	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	10968.57705	kWh/a

Qualitative information

S.4 Consensus Mechanism

Linea is present on the following networks: Ethereum, Linea.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Linea Network uses a Zero-Knowledge Rollup (ZK-Rollup) architecture with a zkEVM for Ethereum compatibility, and its consensus is derived from Ethereum's own proof-of-stake security. While the Network has components like a sequencer for ordering transactions and a coordinator for network management, its consensus mechanism is fundamentally linked to the proof and verification process of zero-knowledge proofs and the security of the Ethereum mainnet. Instead of a typical decentralized consensus on a separate blockchain, the Network inherits its security and state finality from Ethereum.

S.5 Incentive Mechanisms and Applicable Fees

Linea is present on the following networks: Ethereum, Linea.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Like Ethereum, the Network uses a gas system, where gas is the unit of computational effort required to process a transaction. All gas fees on the Network are paid in Ether (ETH). The Network has a base fee that is designed to stabilize at 7 wei. The base fee still decreases or increases based on network traffic, similar to Ethereum, but it does not go below 7 wei. The Network does not require token staking for transaction validation purposes and thus provides no staking rewards. It does not offer incentives for running a full network node. It does charge fees collected by the sequencer for transaction processing. Those fees are paid in ETH, 20% of which are immediately burned while the remaining 80% are converted to Tokens and then burned.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, linea is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Tac Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Tac Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	10359.57600	kWh/a

Qualitative information

S.4 Consensus Mechanism

Toncoin utilizes a Proof of Stake (PoS) model with the Catchain consensus algorithm to provide a secure, scalable, and efficient multi-chain environment.

Core Components of Toncoin's Consensus:

1. Proof of Stake (PoS) with Validators:
   Validator Role: Validators are required to stake Toncoin to participate in consensus. They validate transactions and secure the network by processing blocks and maintaining network integrity.
2. Catchain Consensus Algorithm:
   - High Scalability and Speed: The Catchain consensus protocol is specifically designed for Toncoin's multi-chain architecture, optimizing for fast and scalable operations across multiple shards.
   - Multi-Chain Compatibility: Catchain supports a sharded environment, allowing different chains (or shards) to reach consensus efficiently. This approach enhances the network's ability to process a high volume of transactions in parallel.
3. Byzantine Fault Tolerance (BFT):
   Fault Tolerance: The Catchain protocol is Byzantine Fault Tolerant (BFT), meaning it can tolerate some level of malicious or faulty behavior among validators. This BFT compliance ensures that the network remains secure and functional even when a minority of validators act maliciously.
4. Validator Rotation and Slashing:
   - Regular Rotation: Validators are rotated regularly to enhance decentralization and security. This system prevents any single validator or group from maintaining control over consensus indefinitely.
   - Slashing for Malicious Behavior: Validators who act maliciously or fail to perform their duties may be penalized through slashing, losing a portion of their staked Toncoin. This discourages dishonest behavior and promotes reliable network participation.

S.5 Incentive Mechanisms and Applicable Fees

Toncoin incentivizes network security, participation, and efficiency through staking rewards, transaction fees, and slashing penalties.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   Rewards for Securing the Network: Validators earn staking rewards for actively participating in the network's consensus process and ensuring its security. These rewards are provided in Toncoin and are proportional to each validator's staked amount, encouraging validators to maintain their roles responsibly.
2. Transaction Fees:
   Ongoing Income for Validators: Validators also receive a share of transaction fees from the blocks they validate, providing a consistent reward that grows with network usage. This additional income incentivizes validators to process transactions accurately and efficiently.
3. Decentralization through Validator Rotation:
   Fair and Balanced Participation: The frequent rotation of validators ensures that new participants can join the validator set, promoting decentralization and preventing monopolization of the network by a small group of validators.
4. Slashing Mechanism:
   Penalties for Dishonest Behavior: To maintain security, Toncoin enforces a slashing mechanism that penalizes validators who act maliciously or fail to fulfill their duties. This risk of losing staked Toncoin encourages validators to behave honestly and fulfill their responsibilities.

Applicable Fees:

Transaction Fees: Transaction fees on the TON blockchain are paid in Toncoin. These fees vary based on transaction complexity and network demand, ensuring that validators are compensated for their work and that resources are efficiently utilized.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) toncoin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

paycoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	paycoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	10249.41279	kWh/a

Qualitative information

S.4 Consensus Mechanism

paycoin is present on the following networks: Ethereum, Paycoin.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

PayProtocol is built on a private blockchain using Hyperledger Fabric, where only permissioned peers and nodes can produce blocks and process transactions. As such, the network does not rely on public consensus mechanisms like PoS or PoW but instead ensures performance and security through controlled validator access.

S.5 Incentive Mechanisms and Applicable Fees

paycoin is present on the following networks: Ethereum, Paycoin.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number

of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

adi

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	adi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	9563.56301	kWh/a

Qualitative information

S.4 Consensus Mechanism

adi is present on the following networks: Adi, Ethereum.

ADI Network operates as a zero-knowledge rollup (zkRollup) secured by Ethereum Layer 1. Transactions are executed on the ADI Layer-2, aggregated into batches, and accompanied by zero-knowledge validity proofs that attest to the correctness of each state transition.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

adi is present on the following networks: Adi, Ethereum.

Transaction fees on ADI Network are paid at the Layer-2 level using a custom gas token model. Fees are collected for transaction execution, batching, and the generation of zero-knowledge validity

proofs. A portion of the fees is used to cover the costs of proof verification and final settlement on Ethereum Layer 1.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

memecore

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	memecore	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	9463.50024	kWh/a

Qualitative information

S.4 Consensus Mechanism

memecore is present on the following networks: Binance Smart Chain, Memecore.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously.

Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

MemeCore uses a Proof-of-Meme (PoM) consensus architecture. The network dynamically selects the top seven validator nodes every 10 blocks based on stake. These validators produce blocks using a Proof-of-Authority algorithm, and the validator set is refreshed at each epoch using on-chain delegation controlled by governance.

S.5 Incentive Mechanisms and Applicable Fees

memecore is present on the following networks: Binance Smart Chain, Memecore.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

kujira

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	kujira	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	9204.88607	kWh/a

Qualitative information

S.4 Consensus Mechanism

kujira is present on the following networks: Arbitrum, Ethereum, Kujira, Osmosis.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Kujira is a Layer 1 blockchain built using the Cosmos SDK and operating under the Tendermint Byzantine Fault Tolerant (BFT) consensus mechanism. It employs a Proof-of-Stake (PoS) model, where validators are selected based on the amount of KUJI tokens staked.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

kujira is present on the following networks: Arbitrum, Ethereum, Kujira, Osmosis.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.

- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Kujira's native token, KUJI, serves multiple roles within the network, including staking, governance, and transaction fee payments. Validators and delegators who stake KUJI tokens contribute to network security and, in return, receive rewards proportional to their stake. Transaction fees within the network are paid in KUJI.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

delorean

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	delorean	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	9078.68880	

Field	Value	Unit
		kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5. Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.

3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ChainLink Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ChainLink Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	9069.31983	kWh/a

Qualitative information

S.4 Consensus Mechanism

ChainLink Token is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Gnosis Chain, Optimism, Polygon, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only

the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

ChainLink Token is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Gnosis Chain, Optimism, Polygon, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.

- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, fantom, gnosis_chain, optimism, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Parallel Finance



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Parallel Finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	9066.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Parallel Finance operates as a parachain within the Polkadot network, utilizing Polkadot's shared security model.

S.5 Incentive Mechanisms and Applicable Fees

The native token, PARA, serves multiple functions within the Parallel Finance ecosystem. It is used to pay transaction fees, which are burned, reducing the total supply of PARA over time. PARA is also utilized for staking, allowing token holders to participate in network security and earn rewards.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

integritee

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	integritee	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	8677.57788	kWh/a

Qualitative information

S.4 Consensus Mechanism

integritee is present on the following networks: Ethereum, Integritee.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Integritee is a Substrate-based parachain on Polkadot and Kusama. Block production is handled by collators who submit proofs-of-validity to relay-chain validators for finalization.

S.5 Incentive Mechanisms and Applicable Fees

integritee is present on the following networks: Ethereum, Integritee.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

acurast

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	acurast	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	8278.20000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Acurast runs its own Layer-1 blockchain secured by a Nominated Proof-of-Stake (NPoS) consensus model, where token holders nominate validators.

S.5 Incentive Mechanisms and Applicable Fees

The native token ACU is used to pay transaction and compute execution fees and to participate in staking. Rewards are distributed to participants who contribute compute resources, stake tokens ("Staked Compute"), or act as validators, with portions of inflation allocated to these reward pools. Fees collected on-chain help fund rewards and the network treasury, and token holders can engage in on-chain governance.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

IAGON

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	IAGON	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	7739.46000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Core Components: Cardano uses the Ouroboros consensus mechanism, a Proof of Stake (PoS) protocol designed for scalability, security, and energy efficiency.

Core Concepts:

1. Proof of Stake (PoS): Validators (called slot leaders) are selected based on the amount of ADA they have staked, rather than solving complex computational puzzles. Validators propose and validate blocks, which are added to the blockchain.
2. Epochs and Slot Leaders: Cardano divides time into epochs (fixed time periods), each of which is subdivided into slots. Slot leaders are selected for each slot to validate and propose blocks. Slot leaders are chosen randomly based on the amount of ADA staked. More stake increases the probability of being selected. Validators are responsible for confirming transactions during their slot and passing the block to the next slot leader.
3. Delegation and Staking Pools: ADA holders can delegate their tokens to staking pools, which increases the pool's chances of being selected to validate a block. The pool operator and delegators share the rewards based on their stakes. This system ensures that participants who do not want to operate a full validator node can still earn rewards and contribute to network security by supporting trusted staking pools.
4. Security and Adversary Resistance: Ouroboros ensures security even in the presence of potential attacks. It assumes that adversaries may attempt to propagate alternative chains or send arbitrary messages. The protocol is secure as long as more than 51% of the staked ADA is controlled by honest participants. Settlement Delay: To protect against adversarial attacks, the new slot leader must consider the last few blocks as transient. Only the blocks preceding these are treated as finalized, ensuring that chain finality is secure against manipulation attempts. This mechanism also allows participants to temporarily go offline and resynchronize as long as they are not disconnected for more than the settlement delay period.
5. Chain Selection: Cardano's nodes adopt the longest valid chain rule: each node stores a local copy of the blockchain and replaces it with any discovered valid, longer chain. This ensures that all nodes eventually converge on a single version of the blockchain, maintaining network consistency.

S.5 Incentive Mechanisms and Applicable Fees

Cardano uses incentive mechanisms to ensure network security and decentralization through staking rewards, slashing mechanisms, and transaction fees.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   - Validators, known as slot leaders, secure the network by validating transactions and creating new blocks. To participate, validators must stake ADA, and those with larger stakes are more likely to be selected as slot leaders.
   - Validators are rewarded with newly minted ADA and transaction fees for successfully producing blocks and validating transactions.
   - Delegators, who may not wish to run a validator node, can delegate their ADA to staking pools. By doing so, they contribute to the network's security and earn a share of the rewards earned by the pool. The rewards are distributed proportionally based on the amount of ADA delegated.

2. Slashing Mechanism:
   - To prevent malicious behavior, Cardano employs a slashing mechanism. Validators who act dishonestly, fail to validate transactions properly, or produce incorrect blocks face penalties that involve the slashing of a portion of their staked ADA.
   - This provides strong economic incentives for validators to act honestly and ensures the network's integrity and security.
3. Delegation and Pool Operation:
   - Staking pools can charge operation fees (a margin on rewards) to maintain their infrastructure. This includes fixed costs set by pool operators. Delegators earn rewards after pool fees are deducted, providing a balanced incentive for both operators and delegators to participate actively.
   - Rewards are distributed at the end of each epoch, where staking pool performance and participation determine the distribution of ADA rewards to all stakeholders.

Applicable Fees:

1. Transaction Fees:
   - Transaction fees on Cardano are paid in ADA and are generally low. They are calculated based on the size of the transaction and the network's current demand. These fees are paid to validators for including transactions in new blocks.
   - The fee formula is: a + b × size, where a is a constant (typically 0.155381 ADA), b is a coefficient related to the transaction size (0.000043946 ADA/byte), and size refers to the transaction size in bytes. This ensures that the fee adapts based on network load and the size of each transaction.
2. Staking Pool Fees:
   - Staking pool operators charge operational costs and a margin fee, which covers the cost of running and maintaining the staking pool. These fees vary between pools but ensure that operators can continue to provide their services while offering rewards to delegators.
   - After the operator's fee, the remaining rewards are distributed among the delegators based on the size of their stake.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) cardano is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

kintsugi

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	kintsugi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	6701.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Kintsugi operates as a parachain within the Kusama network, utilizing the shared security model provided by Kusama's relay chain validators. This setup ensures efficient block production and finality, leveraging Kusama's robust infrastructure to maintain network integrity.

S.5 Incentive Mechanisms and Applicable Fees

The Kintsugi network's native token, KINT, serves multiple roles, including transaction fee payments, governance participation, and incentivization of network participants. Additionally, KINT holders can participate in governance decisions.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Balancer

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Balancer	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	6612.91364	kWh/a

Qualitative information

S.4 Consensus Mechanism

Balancer is present on the following networks: Arbitrum, Ethereum, Gnosis Chain, Optimism, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.

- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Balancer is present on the following networks: Arbitrum, Ethereum, Gnosis Chain, Optimism, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain’s incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders’ economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they

have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:
- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:
- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:
Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:
State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, gnosis_chain, optimism, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the

hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ZKsync

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ZKsync	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	6570.57934	kWh/a

Qualitative information

S.4 Consensus Mechanism

zkSync operates as a Layer 2 scaling solution for Ethereum, leveraging zero-knowledge rollups (ZK-Rollups) to enable fast, cost-effective, and secure transactions. This consensus mechanism allows zkSync to offload transaction computation from Ethereum's Layer 1, ensuring scalability while maintaining Ethereum's base-layer security.

Core Components:

- Zero-Knowledge Rollups (ZK-Rollups):
  zkSync aggregates multiple transactions off-chain and processes them in batches. A cryptographic proof, called a validity proof, is generated for each batch and submitted to the Ethereum mainnet. This ensures that all transactions are valid and compliant with Ethereum's rules without processing them individually on Layer 1.
- Validity Proofs:
  zkSync uses zk-SNARKs (Succinct Non-Interactive Arguments of Knowledge) for its validity proofs. These proofs provide mathematical guarantees that transactions within a batch are valid, eliminating the need for Ethereum nodes to re-execute off-chain transactions.
- Sequencers:
  Transactions on zkSync are ordered and processed by sequencers, which bundle transactions into batches. Sequencers maintain network efficiency and provide fast confirmations.
- Fraud Resistance:
  Unlike Optimistic Rollups, zkSync relies on validity proofs rather than fraud proofs, meaning that transactions are final and secure as soon as the validity proof is accepted by Ethereum.
- Data Availability:
  All transaction data is stored on-chain, ensuring that the network remains decentralized and users can reconstruct the state of zkSync at any time.

S.5 Incentive Mechanisms and Applicable Fees

zkSync incentivizes network participants through a streamlined fee structure and role-based rewards, designed to ensure security, scalability, and usability for both users and validators.

Incentive Mechanism:

- Validator Rewards: Validators, who generate validity proofs and secure the network, are compensated through transaction fees paid by users. Their role ensures that batches of transactions are processed efficiently and accurately.
- Sequencer Incentives: Sequencers are responsible for bundling and ordering transactions off-chain. They earn a share of the transaction fees for maintaining network performance and fast processing times.
- Ecosystem Growth Rewards: zkSync allocates resources to incentivize developers and projects building on its platform, fostering a robust ecosystem of dApps, DeFi protocols, and NFT marketplaces.

Applicable Fees:

- Transaction Fees: Users pay fees in Ether (ETH) for transactions on zkSync. These fees are significantly lower than Ethereum Layer 1 fees, as zkSync processes transactions off-chain and submits only aggregated proofs to the Ethereum mainnet.
- Fee Model: Fees are dynamically calculated based on the complexity of transactions (e.g., token transfers, smart contract interactions) and the cost of submitting validity proofs to Ethereum.
- Scalability Benefits: zkSync's efficient rollup architecture reduces gas fees for users while ensuring that validators and sequencers are appropriately compensated for their roles.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) zksync is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

KILT

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/

Field	Value	Unit
S.3 Name of the crypto-asset	KILT	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	6307.20000	kWh/a

Qualitative information

S.4 Consensus Mechanism

KILT operates as a parachain within the Polkadot ecosystem, utilizing a Limited Delegated Proof-of-Stake (LDPoS) consensus model.

S.5 Incentive Mechanisms and Applicable Fees

The native token, KILT, serves multiple roles within the network, including transaction fee payments, staking, and governance participation. Collators and their supporting delegators receive rewards for their contributions to block production and network security.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

build_on_bitcoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	build_on_bitcoin	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	5525.46741	kWh/a

Qualitative information

S.4 Consensus Mechanism

build_on_bitcoin is present on the following networks: Build On Bitcoin, Ethereum.

In Phase 1, the BOB network operates with a sequencers that orders transactions, produces blocks, and submits state commitments to the Ethereum mainnet. Consensus on state correctness is achieved through an optimistic model, where submitted commitments can be challenged on Ethereum via a fault-proof mechanism.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

build_on_bitcoin is present on the following networks: Build On Bitcoin, Ethereum.

In Phase 1, users pay transaction fees that are collected by the sequencer for processing and ordering transactions. These fees are primarily used to cover the costs associated with submitting state commitments to the Ethereum mainnet. Transaction fees are paid in ETH and reflect the underlying costs of Layer-1 settlement.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Curve DAO Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Curve DAO Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	4224.21453	kWh/a

Qualitative information

S.4 Consensus Mechanism

Curve DAO Token is present on the following networks: Arbitrum, Ethereum, Fantom, Gnosis Chain, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.

- DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.

2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Curve DAO Token is present on the following networks: Arbitrum, Ethereum, Fantom, Gnosis Chain, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.

- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom’s incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, fantom, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the

hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

open_ledger

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	open_ledger	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	4080.39420	kWh/a

Qualitative information

S.4 Consensus Mechanism

open_ledger is present on the following networks: Binance Smart Chain, Ethereum, Open Ledger.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

OpenLedger is built as an Ethereum-Layer-2 rollup using the OP Stack. It batches and orders transactions off-chain, submitting them to Ethereum for final settlement, inheriting Ethereum's security via fraud-proof mechanisms.

S.5 Incentive Mechanisms and Applicable Fees

open_ledger is present on the following networks: Binance Smart Chain, Ethereum, Open Ledger.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The native token, OPEN, is used for gas fees, staking, payments for model inference, and access to datasets and model registries. Contributors of data receive OPEN tokens via a “Proof of Attribution”

mechanism when their data influences model outputs. OPEN holders also participate in governance, and a portion of token supply is allocated to ecosystem incentives.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Velodrome

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Velodrome	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	3864.85974	kWh/a

Qualitative information

S.4 Consensus Mechanism

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number

of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Aave Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Aave Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	3342.14864	kWh/a

Qualitative information

S.4 Consensus Mechanism

Aave Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Huobi, Near Protocol, Polygon, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Key Features of HECO's Consensus Mechanism:

1. Validator Selection: HECO supports up to 21 validators, selected based on their stake in the network.
2. Transaction Processing: Validators are responsible for processing transactions and adding blocks to the blockchain.
3. Transaction Finality: The consensus mechanism ensures quick finality, allowing for rapid confirmation of transactions.
4. Energy Efficiency: By utilizing PoS elements, HECO reduces energy consumption compared to traditional Proof-of-Work systems.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here’s a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Aave Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Huobi, Near Protocol, Polygon, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Incentive Mechanism:

1. Validator Rewards:
   Validators are selected based on their stake in the network. They process transactions and add blocks to the blockchain. Validators receive rewards in the form of transaction fees for their role in maintaining the blockchain's integrity.
2. Staking Participation:
   Users can stake Huobi Token (HT) to become validators or delegate their tokens to existing validators. Staking helps secure the network and, in return, participants receive a portion of the transaction fees as rewards.

Applicable Fees:

1. Transaction Fees (Gas Fees):
   Users pay gas fees in HT tokens to execute transactions and interact with smart contracts on the HECO network. These fees compensate validators for processing and validating transactions.

2. Smart Contract Execution Fees:
   Deploying and interacting with smart contracts incur additional fees, which are also paid in HT tokens. These fees cover the computational resources required to execute contract code.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.
3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.
2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, gnosis_chain, huobi, near_protocol, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier

Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

interlay

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	interlay	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	3153.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Polkadot, a heterogeneous multi-chain framework designed to enable different blockchains to interoperate, uses a sophisticated consensus mechanism known as Nominated Proof-of-Stake (NPoS). This mechanism combines elements of Proof-of-Stake (PoS) and a layered consensus model involving multiple roles and stages.

Core Components:

1. Validators: Validators are responsible for producing new blocks and finalizing the relay chain, Polkadot's main chain. They stake DOT tokens and validate transactions, ensuring the security and integrity of the network.
2. Nominators: Nominators delegate their stake to trusted validators, choosing which validators they believe will act honestly and effectively. They share in the rewards and penalties of the validators they nominate.
3. Collators: Collators maintain parachains (individual blockchains that connect to the Polkadot relay chain) by collecting transactions from users and producing state transition proofs for validators.
4. Fishermen: Fishermen monitor the network for malicious activity. They report bad behavior to the validators to help maintain network security.

Consensus Process: Polkadot's consensus mechanism operates through a combination of two key protocols: GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) and BABE (Blind Assignment for Blockchain Extension).

1. BABE (Block Production): BABE is the block production mechanism. It operates similarly to a lottery, where validators are pseudo-randomly assigned slots to produce blocks based on their

stake. Each validator signs the blocks they produce, which are then propagated through the network.
2. GRANDPA (Finality): GRANDPA is the finality gadget that provides a higher level of security by finalizing blocks after they are produced. Unlike traditional blockchains where blocks are considered final after a number of confirmations, GRANDPA allows for asynchronous finality. Validators vote on chains, and once a supermajority agrees, the chain is finalized instantly.

Detailed Steps:

1. Block Production (BABE):
   - Slot Allocation: Validators are selected to produce blocks in specific time slots.
   - Block Proposal: The selected validator for a slot proposes a block, including new transactions and state changes.
2. Block Propagation and Preliminary Consensus: Proposed blocks are propagated across the network, where other validators verify the correctness of the transactions and state transitions.
3. Finalization (GRANDPA):
   - Voting on Blocks: Validators vote on the chains they believe to be the correct history.
   - Supermajority Agreement: Once more than two-thirds of validators agree on a block, it is finalized.
   - Instant Finality: This finality process ensures that once a block is finalized, it is irreversible and becomes part of the canonical chain.
4. Rewards and Penalties: Validators and nominators earn rewards for participating in the consensus process and maintaining network security. Misbehavior, such as producing invalid blocks or being offline, results in penalties, including slashing of staked tokens.

S.5 Incentive Mechanisms and Applicable Fees

Polkadot uses a consensus mechanism called Nominated Proof-of-Stake (NPoS), which involves a combination of validators, nominators, and a unique layered consensus process to secure the network:

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are responsible for producing new blocks and finalizing the relay chain. They are incentivized with staking rewards, which are distributed in proportion to their stake and their performance in the consensus process. Validators earn these rewards for maintaining uptime and correctly validating transactions.
   - Commission: Validators can set a commission rate that they charge on the rewards earned by their nominators. This incentivizes them to perform well to attract more nominators.
2. Nominators:
   - Delegation: Nominators stake their tokens by delegating them to trusted validators. They share in the rewards earned by the validators they support. This mechanism incentivizes nominators to carefully choose reliable validators.
   - Rewards Distribution: The rewards are distributed among validators and their nominators based on the amount of stake contributed by each party. This ensures that both parties are incentivized to maintain the network's security.
3. Collators:
   Parachain Maintenance: Collators maintain parachains by collecting transactions and producing state transition proofs for validators. They are incentivized through rewards for their role in keeping the parachain operational and secure.

4. Fishermen:
   Monitoring: Fishermen are responsible for monitoring the network for malicious activities. They are rewarded for identifying and reporting malicious behavior, which helps maintain the network's security.
5. Economic Penalties:
   - Slashing: Validators and nominators face penalties in the form of slashing if they engage in malicious activities such as double-signing or being offline for extended periods. Slashing results in the loss of a portion of their staked tokens, which serves as a strong deterrent against bad behavior.
   - Unbonding Period: To withdraw staked tokens, participants must go through an unbonding period during which their tokens are still at risk of being slashed. This ensures continued network security even when validators or nominators decide to exit.

Fees on the Polkadot Blockchain:

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Polkadot are dynamic, adjusting based on network demand and the complexity of the transaction. This model ensures that fees remain fair and proportional to the network's usage.
   - Fee Burn: A portion of the transaction fees is burned (permanently removed from circulation), which helps to control inflation and can potentially increase the value of the remaining tokens.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Polkadot are based on the computational resources required. This encourages efficient use of network resources.
3. Parachain Slot Auction Fees:
   Bidding for Slots: Projects that want to secure a parachain slot must participate in a slot auction. They bid DOT tokens, and the highest bidders win the right to operate a parachain for a specified period. This process ensures that only serious projects with significant backing can secure parachain slots, contributing to the network's overall quality and security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) polkadot is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Axie Infinity Shard

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Axie Infinity Shard	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	2836.38504	kWh/a

Qualitative information

S.4 Consensus Mechanism

Axie Infinity Shard is present on the following networks: Binance Smart Chain, Ethereum, Harmony One, Ronin, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.

6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):
   - Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.
   - Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.
2. Sharding with PBFT Finality:
   - Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
   - Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

Ronin utilizes a Delegated Proof of Stake (DPoS) consensus mechanism, where community-elected validators are responsible for securing the network and validating transactions.

Core Components of Ronin's Consensus:

1. Delegated Proof of Stake (DPoS):
   - Community Voting for Validator Selection: RON token holders delegate their tokens to vote for validators, who are then selected to produce blocks, validate transactions, and maintain network security. Validators with the most votes are chosen to participate in consensus.

- Periodic Validator Rotation: Validators are regularly rotated based on community votes, enhancing decentralization and preventing long-term control by any single validator group. This rotation supports both security and fairness.

2. Incentive-Driven Voting System:
   Alignment with Community Interests: The voting system ensures that validators remain aligned with community goals. Validators that fail to perform adequately or act against network interests may lose votes and be replaced by more trusted participants.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.

- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Axie Infinity Shard is present on the following networks: Binance Smart Chain, Ethereum, Harmony One, Ronin, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.
2. Decentralization Penalty for High Stake:
   Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:
   Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

Ronin's incentive model combines rewards, slashing mechanisms, and governance features to support network security and encourage active community participation.

Incentive Mechanisms:

1. Rewards for Validators and Delegators:
   - Staking Rewards for Validators: Validators earn RON tokens as rewards for successfully producing blocks and validating transactions. These rewards incentivize validators to fulfill their duties diligently, maintaining network stability.
   - Delegator Rewards: Delegators who stake their tokens with selected validators also earn a portion of the staking rewards. This sharing of rewards promotes broad participation from token holders in network security and governance.
2. Slashing Mechanism for Accountability:
   - Penalty for Malicious Behavior: A slashing mechanism penalizes validators who act dishonestly or fail to meet performance standards by cutting a portion of their staked RON tokens. This deters misbehavior and encourages responsible participation.
   - Delegator Risk: Delegators who stake with misbehaving validators are also subject to slashing, which encourages them to choose trustworthy validators and monitor performance carefully.
3. Governance Participation:
   RON Token for Governance: Beyond staking and transaction fees, the RON token enables token holders to participate in governance. This includes voting on network upgrades, validator selection, and other protocol decisions, giving token holders a voice in network direction and policy.

Applicable Fees:

Transaction Fees: Fees are paid in RON tokens, contributing to validator rewards and helping to maintain network operations. These fees are designed to be affordable, ensuring accessibility for users while supporting validators' roles.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.

- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, harmony_one, ronin, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SHIBA INU 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SHIBA INU	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/

Field	Value	Unit
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	2831.09522	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Sui Name Service

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Sui Name Service	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2763.07920	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.

5.Fault Tolerance:
The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:
Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Uniswap

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Uniswap	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	2631.05908	kWh/a

Qualitative information

S.4 Consensus Mechanism

Uniswap is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here’s a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Uniswap is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Pepe 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Pepe	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	2518.15259	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Walrus

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Walrus	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2239.57793	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5. Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.

2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Deepbook Protocol

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Deepbook Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2239.57793	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.

- Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
- Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.

2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5. Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

sky 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	sky	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	2194.35769	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Ondo

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ondo	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	2136.47891	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

fly

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	fly	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/

Field	Value	Unit
S.8 Energy consumption	2108.97000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Sonic utilizes a Proof-of-Stake (PoS) consensus mechanism integrated with a Directed Acyclic Graph (DAG) architecture to enhance scalability and efficiency. Validators are required to stake the network's native $S tokens, with a minimum of 500,000 $S tokens needed to operate a validator node. This substantial staking requirement ensures that validators have a significant investment in the network's integrity.

S.5 Incentive Mechanisms and Applicable Fees

Sonic's economic model is designed to incentivize active participation from both validators and developers. Validators earn rewards through a combination of block rewards and transaction fees. The block reward system employs a dynamic Annual Percentage Rate (APR) mechanism.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sonic is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

solana_mobile_seeker

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	solana_mobile_seeker	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/

Field	Value	Unit
S.8 Energy consumption	2084.43249	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator’s stake and performance.

- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

seeker

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	seeker	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2084.43249	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

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   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
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Security and Economic Incentives:

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   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
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S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
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   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
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   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

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   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

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sentient

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	sentient	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2016.67834	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Pendle

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Pendle	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1991.98796	kWh/a

Qualitative information

S.4 Consensus Mechanism

Pendle is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Pendle is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.

- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

scallop

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	scallop	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1973.62800	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5.Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

lofi 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	lofi	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1973.62800	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5.Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.

2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Euro Coin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Euro Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1886.09643	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Memecoin



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Memecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1817.43631	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

PancakeSwap

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	PancakeSwap	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1746.06036	kWh/a

Qualitative information

S.4 Consensus Mechanism

PancakeSwap is present on the following networks: Aptos Coin, Arbitrum, Base, Binance Smart Chain, Ethereum, Linea, Zksync.

Aptos utilizes a Proof-of-Stake approach combined with a BFT consensus protocol to ensure high throughput, low latency, and secure transaction processing.

Core Components:

- Parallel Execution: Transactions are processed concurrently using Block-STM, a parallel execution engine, enabling high performance and scalability.
- Leader-Based BFT: A leader is selected among validators to propose blocks, while others validate and finalize transactions.
- Dynamic Validator Rotation: Validators are rotated regularly, enhancing decentralization and preventing collusion.
- Instant Finality: Transactions achieve finality once validated, ensuring that they are irreversible.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Linea Network uses a Zero-Knowledge Rollup (ZK-Rollup) architecture with a zkEVM for Ethereum compatibility, and its consensus is derived from Ethereum's own proof-of-stake security. While the Network has components like a sequencer for ordering transactions and a coordinator for network management, its consensus mechanism is fundamentally linked to the proof and verification process of zero-knowledge proofs and the security of the Ethereum mainnet. Instead of a typical decentralized consensus on a separate blockchain, the Network inherits its security and state finality from Ethereum.

zkSync operates as a Layer 2 scaling solution for Ethereum, leveraging zero-knowledge rollups (ZK-Rollups) to enable fast, cost-effective, and secure transactions. This consensus mechanism allows zkSync to offload transaction computation from Ethereum's Layer 1, ensuring scalability while maintaining Ethereum's base-layer security.

Core Components:

- Zero-Knowledge Rollups (ZK-Rollups):
  zkSync aggregates multiple transactions off-chain and processes them in batches. A cryptographic proof, called a validity proof, is generated for each batch and submitted to the Ethereum mainnet. This ensures that all transactions are valid and compliant with Ethereum's rules without processing them individually on Layer 1.

- Validity Proofs:
  zkSync uses zk-SNARKs (Succinct Non-Interactive Arguments of Knowledge) for its validity proofs. These proofs provide mathematical guarantees that transactions within a batch are valid, eliminating the need for Ethereum nodes to re-execute off-chain transactions.
- Sequencers:
  Transactions on zkSync are ordered and processed by sequencers, which bundle transactions into batches. Sequencers maintain network efficiency and provide fast confirmations.
- Fraud Resistance:
  Unlike Optimistic Rollups, zkSync relies on validity proofs rather than fraud proofs, meaning that transactions are final and secure as soon as the validity proof is accepted by Ethereum.
- Data Availability:
  All transaction data is stored on-chain, ensuring that the network remains decentralized and users can reconstruct the state of zkSync at any time.

S.5 Incentive Mechanisms and Applicable Fees

PancakeSwap is present on the following networks: Aptos Coin, Arbitrum, Base, Binance Smart Chain, Ethereum, Linea, Zksync.

Incentive Mechanism:

- Validator Rewards: Validators earn rewards in APT tokens for validating transactions and producing blocks. Rewards are distributed proportionally based on the stake of validators and their delegators.
- Delegator Participation: APT token holders can delegate their tokens to validators, earning a share of the staking rewards without running their own nodes.
- Slashing Mechanism: Validators face penalties, such as losing staked tokens, for malicious actions or prolonged inactivity, ensuring accountability and network security.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in APT tokens for sending transactions and interacting with smart contracts.
- Dynamic Fee Adjustment: Fees are dynamically adjusted based on network activity and resource usage, ensuring cost efficiency and preventing congestion.
- Fee Distribution: Transaction fees are distributed among validators and delegators, providing an additional incentive for network participation.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.

- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Like Ethereum, the Network uses a gas system, where gas is the unit of computational effort required to process a transaction. All gas fees on the Network are paid in Ether (ETH). The Network

has a base fee that is designed to stabilize at 7 wei. The base fee still decreases or increases based on network traffic, similar to Ethereum, but it does not go below 7 wei. The Network does not require token staking for transaction validation purposes and thus provides no staking rewards. It does not offer incentives for running a full network node. It does charge fees collected by the sequencer for transaction processing. Those fees are paid in ETH, 20% of which are immediately burned while the remaining 80% are converted to Tokens and then burned.

zkSync incentivizes network participants through a streamlined fee structure and role-based rewards, designed to ensure security, scalability, and usability for both users and validators.

Incentive Mechanism:

- Validator Rewards: Validators, who generate validity proofs and secure the network, are compensated through transaction fees paid by users. Their role ensures that batches of transactions are processed efficiently and accurately.
- Sequencer Incentives: Sequencers are responsible for bundling and ordering transactions off-chain. They earn a share of the transaction fees for maintaining network performance and fast processing times.
- Ecosystem Growth Rewards: zkSync allocates resources to incentivize developers and projects building on its platform, fostering a robust ecosystem of dApps, DeFi protocols, and NFT marketplaces.

Applicable Fees:

- Transaction Fees: Users pay fees in Ether (ETH) for transactions on zkSync. These fees are significantly lower than Ethereum Layer 1 fees, as zkSync processes transactions off-chain and submits only aggregated proofs to the Ethereum mainnet.
- Fee Model: Fees are dynamically calculated based on the complexity of transactions (e.g., token transfers, smart contract interactions) and the cost of submitting validity proofs to Ethereum.
- Scalability Benefits: zkSync's efficient rollup architecture reduces gas fees for users while ensuring that validators and sequencers are appropriately compensated for their roles.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) aptos_coin, arbitrum, base, binance_smart_chain, ethereum, linea, zksync is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

cyber 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	cyber	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1720.08906	kWh/a

Qualitative information

S.4 Consensus Mechanism

cyber is present on the following networks: Binance Smart Chain, Cyber, Ethereum, Optimism.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives

7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Cyber operates as a Layer 2 network built on the Ethereum ecosystem, utilizing the OP Stack from Optimism and integrating EigenDA for data availability. The network employs a decentralized sequencer and verifier architecture.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

cyber is present on the following networks: Binance Smart Chain, Cyber, Ethereum, Optimism.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The native token, CYBER, serves multiple functions within the Cyber ecosystem. CYBER holders can participate in governance decisions, influencing protocol parameters and development directions. Staking CYBER tokens enables users to secure the network and earn rewards.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.

- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, cyber, ethereum, optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

moonwell

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	moonwell	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1647.42252	kWh/a

Qualitative information

S.4 Consensus Mechanism

moonwell is present on the following networks: Base, Moonbeam, Optimism.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Moonbeam employs a Delegated Proof of Stake (DPoS) consensus mechanism combined with the Polkadot relay chain for enhanced scalability, finality, and security. It utilizes collators and validators, with finality provided by the GRANDPA finality gadget, ensuring deterministic block finality.

Key Features of Moonbeam's Consensus Mechanism:

1. Delegated Proof of Stake (DPoS):
   - Collators and Validators: In Moonbeam's DPoS system, collators maintain the parachain by collecting transactions from users and producing state transition proofs. The collator set is chosen based on the stake they have, including delegated stake. Delegation: Token holders can delegate their stake to collator candidates. The top collator candidates, including those with delegated stake, join the active set. Collators in the active set are randomly selected to produce blocks.
   - Stakes and Block Production: Once a collator is in the active set, their total stake does not impact their chance of being selected to produce blocks.
2. Polkadot Relay Chain Integration:
   Moonbeam is built as a parachain on Polkadot, which provides shared security, scalability, and consensus. The relay chain validators ensure that Moonbeam's blocks are validated and secured.
3. GRANDPA Finality:
   - Deterministic Finality: Moonbeam relies on Polkadot's GRANDPA finality gadget, which provides fast and deterministic finality for transactions. When a block is finalized, it cannot be reverted except through on-chain governance or forking.
   - Parallel Finality: The finality process in Moonbeam occurs simultaneously with block production, unlike Ethereum, which has slower finality. GRANDPA allows for the quick confirmation of blocks, often within a single block on Moonbeam.

4. Block Production:
   Blocks are produced by collators who are selected based on their stake and delegated stake, contributing to the network's decentralized nature.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

moonwell is present on the following networks: Base, Moonbeam, Optimism.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined

into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Moonbeam incentivizes participation through staking rewards for collators and token holders, alongside transaction fees.

Incentive Mechanism:

1. Collator Rewards:
   - Block Rewards: Collators are rewarded with newly minted tokens for successfully producing and validating blocks. These rewards are distributed proportionally to the collators in the active set.
   - Transaction Fees: Collators also earn transaction fees from the transactions included in the blocks they produce. These fees are paid by users to prioritize their transactions.
2. Delegation Rewards:
   - Delegated Stake: Token holders can delegate their stake to collator candidates. By doing so, they share in the rewards earned by the collators to whom they delegate their tokens. This incentivizes the broader community to participate in governance and block production.
   - Voting Power: Token holders who delegate their stake to collators help secure the network and participate in the selection of active collators.
3. Governance Participation:
   Voting on Network Proposals: Moonbeam uses its native tokens to allow participants to vote on governance proposals, helping to influence the future direction of the network and incentivizing active involvement in network management.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Transaction fees on Moonbeam are determined based on the complexity and size of the transaction. Users pay these fees in the native token (GLMR), which are distributed to the collators.
   - Fee Distribution: The fees are split between collators, incentivizing them to process transactions efficiently. The amount of transaction fees can vary depending on network congestion and the size of the transaction.
2. Staking Fees:
   Collator Staking: Collators must stake a certain amount of tokens to be eligible for block production. They are incentivized with staking rewards and transaction fees for ensuring the network's security and functionality.
3. Governance Fees:
   Voting Fees: Users may need to pay small fees to participate in governance, such as proposing changes or voting on proposals. These fees ensure governance is utilized effectively and prevents spam on the network.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, moonbeam, optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number

of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Pump.fun

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Pump.fun	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1560.54745	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators.

This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

tbtc

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	tbtc	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1478.45707	kWh/a

Qualitative information

S.4 Consensus Mechanism

tbtc is present on the following networks: Arbitrum, Base, Ethereum, Optimism, Polygon, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

tbtc is present on the following networks: Arbitrum, Base, Ethereum, Optimism, Polygon, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or

going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, ethereum, optimism, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ENA

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ENA	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1433.84752	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

DuckChain Token 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	DuckChain Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1419.12000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Toncoin utilizes a Proof of Stake (PoS) model with the Catchain consensus algorithm to provide a secure, scalable, and efficient multi-chain environment.

Core Components of Toncoin's Consensus:

1. Proof of Stake (PoS) with Validators:
   Validator Role: Validators are required to stake Toncoin to participate in consensus. They validate transactions and secure the network by processing blocks and maintaining network integrity.
2. Catchain Consensus Algorithm:
   - High Scalability and Speed: The Catchain consensus protocol is specifically designed for Toncoin's multi-chain architecture, optimizing for fast and scalable operations across multiple shards.
   - Multi-Chain Compatibility: Catchain supports a sharded environment, allowing different chains (or shards) to reach consensus efficiently. This approach enhances the network's ability to process a high volume of transactions in parallel.
3. Byzantine Fault Tolerance (BFT):
   Fault Tolerance: The Catchain protocol is Byzantine Fault Tolerant (BFT), meaning it can tolerate some level of malicious or faulty behavior among validators. This BFT compliance ensures that the network remains secure and functional even when a minority of validators act maliciously.
4. Validator Rotation and Slashing:
   - Regular Rotation: Validators are rotated regularly to enhance decentralization and security. This system prevents any single validator or group from maintaining control over consensus indefinitely.
   - Slashing for Malicious Behavior: Validators who act maliciously or fail to perform their duties may be penalized through slashing, losing a portion of their staked Toncoin. This discourages dishonest behavior and promotes reliable network participation.

S.5 Incentive Mechanisms and Applicable Fees

Toncoin incentivizes network security, participation, and efficiency through staking rewards, transaction fees, and slashing penalties.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   Rewards for Securing the Network: Validators earn staking rewards for actively participating in the network's consensus process and ensuring its security. These rewards are provided in Toncoin and are proportional to each validator's staked amount, encouraging validators to maintain their roles responsibly.
2. Transaction Fees:
   Ongoing Income for Validators: Validators also receive a share of transaction fees from the blocks they validate, providing a consistent reward that grows with network usage. This additional income incentivizes validators to process transactions accurately and efficiently.
3. Decentralization through Validator Rotation:
   Fair and Balanced Participation: The frequent rotation of validators ensures that new participants can join the validator set, promoting decentralization and preventing monopolization of the network by a small group of validators.
4. Slashing Mechanism:
   Penalties for Dishonest Behavior: To maintain security, Toncoin enforces a slashing mechanism that penalizes validators who act maliciously or fail to fulfill their duties. This risk of losing staked Toncoin encourages validators to behave honestly and fulfill their responsibilities.

Applicable Fees:

Transaction Fees: Transaction fees on the TON blockchain are paid in Toncoin. These fees vary based on transaction complexity and network demand, ensuring that validators are compensated for their work and that resources are efficiently utilized.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) toncoin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Onyxcoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/

Field	Value	Unit
S.3 Name of the crypto-asset	Onyxcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1387.79795	kWh/a

Qualitative information

S.4 Consensus Mechanism

Onyxcoin is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.

6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Onyxcoin is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

1INCH Token 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	1INCH Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1379.55999	kWh/a

Qualitative information

S.4 Consensus Mechanism

1INCH Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.

- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously.

Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.

- Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

1INCH Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain’s incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.

- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.
3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, gnosis_chain, near_protocol, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SPX6900 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SPX6900	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1340.96530	kWh/a

Qualitative information

S.4 Consensus Mechanism

SPX6900 is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

SPX6900 is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number

of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Artificial Superintelligence Alliance

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Artificial Superintelligence Alliance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1182.39708	kWh/a

Qualitative information

S.4 Consensus Mechanism

Artificial Superintelligence Alliance is present on the following networks: Binance Smart Chain, Cosmos, Ethereum, Osmosis.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
   - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.
   - Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.
2. Modular Cosmos SDK Framework:
   - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.
   - Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Artificial Superintelligence Alliance is present on the following networks: Binance Smart Chain, Cosmos, Ethereum, Osmosis.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.
2. Slashing for Accountability:
   Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:
   User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.
2. Customizable Fee Model:
   Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, cosmos, ethereum, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Convex Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Convex Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/

Field	Value	Unit
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1156.36983	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Lucky Kat

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Lucky Kat	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	986.81400	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.

5.Fault Tolerance:
The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:
Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Worldcoin



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Worldcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	982.52136	kWh/a

Qualitative information

S.4 Consensus Mechanism

Worldcoin is present on the following networks: Ethereum, Optimism.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.

- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

Worldcoin is present on the following networks: Ethereum, Optimism.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.

- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Star Atlas

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Star Atlas	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	946.86265	kWh/a

Qualitative information

S.4 Consensus Mechanism

Star Atlas is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously.

Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Star Atlas is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more

tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

LayerZero

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	LayerZero	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	941.66484	kWh/a

Qualitative information

S.4 Consensus Mechanism

LayerZero is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

LayerZero is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.

- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Quant

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Quant	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	926.20237	kWh/a

Qualitative information

S.4 Consensus Mechanism

Quant is present on the following networks: Energi, Ethereum.

Energi operates on a Proof of Stake (PoS) consensus mechanism supported by a masternode system. Validators, or "stakers," secure the network by locking up NRG tokens to validate transactions and maintain network integrity.

Core Components:

1. Proof of Stake (PoS):
   Validators lock up NRG tokens and earn rewards for confirming transactions based on their staked amount, ensuring active participation in network security.
2. Masternode System:
   - Collateral Requirement: To operate a masternode, users must lock up 1,000 NRG as collateral. Masternodes contribute to transaction validation, security, and governance, playing a central role in network functionality.
   - Governance Participation: Masternodes vote on network proposals, protocol changes, and community initiatives, enabling decentralized decision-making.
3. Self-Funding Treasury:
   A portion of block rewards funds the treasury, which supports development, marketing, and community projects, ensuring Energi's growth and development over time

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Quant is present on the following networks: Energi, Ethereum.

Energi incentivizes both stakers and masternodes with block rewards, supporting network security and governance. Transaction fees contribute to network sustainability.

Incentive Mechanisms:

Staking and Masternode Rewards:
- Staker Rewards: Validators earn a portion of block rewards for transaction validation.
- Masternode Rewards: Masternodes receive rewards for their roles in governance and network support, ensuring active engagement in network development.

Applicable Fees:

1. Transaction Fees:
   Low Cost: Users pay transaction fees in NRG, which are generally low and provide additional rewards for validators and masternodes, supporting network operations.
2. Balanced Reward Structure:
   Inflation Control: Energi's rewards structure is designed to maintain inflation balance with sustainable rewards, incentivizing long-term network participation.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) energi, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Mog Coin



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Mog Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/

Field	Value	Unit
S.8 Energy consumption	899.96835	kWh/a

Qualitative information

S.4 Consensus Mechanism

Mog Coin is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Mog Coin is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Eigen

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Eigen	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	884.63746	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon

Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Jito Staked SOL

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Jito Staked SOL	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	803.53787	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Morpho Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Morpho Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	797.56632	kWh/a

Qualitative information

S.4 Consensus Mechanism

Morpho Token is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only

validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Morpho Token is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy

consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Fartcoin



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Fartcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	778.55058	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Frax Share

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Frax Share	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	759.19430	kWh/a

Qualitative information

S.4 Consensus Mechanism

Frax Share is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.

- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Frax Share is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, fantom, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Stronghold SHx

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Stronghold SHx	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	753.14305	kWh/a

Qualitative information

S.4 Consensus Mechanism

Stronghold SHx is present on the following networks: Ethereum, Stellar.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Stellar uses a unique consensus mechanism known as the Stellar Consensus Protocol (SCP).

Core Concepts:

1. Federated Byzantine Agreement (FBA):
   - SCP is built on the principles of Federated Byzantine Agreement (FBA), which allows decentralized, leaderless consensus without the need for a closed system of trusted participants.
   - Quorum Slices: Each node in the network selects a set of other nodes (quorum slice) that it trusts. Consensus is achieved when these slices overlap and collectively agree on the transaction state.
2. Nodes and Validators:
   - Nodes: Nodes running the Stellar software participate in the network by validating transactions and maintaining the ledger.
   - Validators: Nodes that are responsible for validating transactions and reaching consensus on the state of the ledger. Consensus Process
3. Transaction Validation:
   Transactions are submitted to the network and nodes validate them based on predetermined rules, such as sufficient balances and valid signatures.
4. Nomination Phase:
   - Nomination: Nodes nominate values (proposed transactions) that they believe should be included in the next ledger. Nodes communicate their nominations to their quorum slices.
   - Agreement on Nominations: Nodes vote on the nominated values, and through a process of voting and federated agreement, a set of candidate values emerges. This phase continues until nodes agree on a single value or a set of values.

5. Ballot Protocol (Voting and Acceptance): Balloting:
   - The agreed-upon values from the nomination phase are then put into ballots. Each ballot goes through multiple rounds of voting, where nodes vote to either accept or reject the proposed values.
   - Federated Voting: Nodes exchange votes within their quorum slices, and if a value receives sufficient votes across overlapping slices, it moves to the next stage.
   - Acceptance and Confirmation: If a value gathers enough votes through multiple stages (prepare, confirm, externalize), it is accepted and externalized as the next state of the ledger.
6. Ledger Update:
   Once consensus is reached, the new transactions are recorded in the ledger. Nodes update their copies of the ledger to reflect the new state. Security and Economic Incentives
7. Trust and Quorum Slices:
   Nodes are free to choose their own quorum slices, which provides flexibility and decentralization. The overlapping nature of quorum slices ensures that the network can reach consensus even if some nodes are faulty or malicious.
8. Stability and Security:
   SCP ensures that the network can achieve consensus efficiently without relying on energy-intensive mining processes. This makes it environmentally friendly and suitable for high-throughput applications.
9. Incentive Mechanisms:
   Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, the network incentivizes participation through the intrinsic value of maintaining a secure, efficient, and reliable payment network.

S.5 Incentive Mechanisms and Applicable Fees

Stronghold SHx is present on the following networks: Ethereum, Stellar.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Stellar’s consensus mechanism, the Stellar Consensus Protocol (SCP), is designed to achieve decentralized and secure transaction validation through a federated Byzantine agreement (FBA) model. Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, it ensures network security and transaction validation through intrinsic network mechanisms and transaction fees.

Incentive Mechanisms:

1. Quorum Slices and Trust:
   - Quorum Slices: Each node in the Stellar network selects other nodes it trusts to form a quorum slice. Consensus is achieved through the intersection of these slices, creating a robust and decentralized trust network.

- Federated Voting: Nodes communicate their votes within their quorum slices, and through multiple rounds of federated voting, they agree on the transaction state. This process ensures that even if some nodes are compromised, the network can still achieve consensus securely.

2. Intrinsic Value and Participation:
   - Network Value: The intrinsic value of participating in a secure, efficient, and reliable payment network incentivizes nodes to act honestly and maintain network security. Organizations and individuals running nodes benefit from the network's functionality and the ability to facilitate transactions.
   - Decentralization: By allowing nodes to choose their own quorum slices, Stellar promotes decentralization, reducing the risk of central points of failure and making the network more resilient to attacks. Fees on the Stellar Blockchain
3. Transaction Fees:
   - Flat Fee Structure: Each transaction on the Stellar network incurs a flat fee of 0.00001 XLM (known as a base fee). This low and predictable fee structure makes Stellar suitable for micropayments and high-volume transactions.
   - Spam Prevention: The transaction fee serves as a deterrent against spam attacks. By requiring a small fee for each transaction, Stellar ensures that the network remains efficient and that resources are not wasted on processing malicious or frivolous transactions.
4. Operational Costs:
   Minimal Fees: The minimal transaction fees on Stellar not only prevent spam but also cover the operational costs of running the network. This ensures that the network can sustain itself without placing a significant financial burden on users.
5. Reserve Requirements:
   - Account Reserves: To create a new account on the Stellar network, a minimum balance of 1 XLM is required. This reserve requirement prevents the creation of an excessive number of accounts, further protecting the network from spam and ensuring efficient resource usage.
   - Trustline and Offer Reserves: Additional reserve requirements exist for creating trustlines and offers on the Stellar decentralized exchange (DEX). These reserves help maintain network integrity and prevent abuse.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, stellar is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Clearpool

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Clearpool	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	734.90448	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Wrapped Eth

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Wrapped Eth	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	706.94343	kWh/a

Qualitative information

S.4 Consensus Mechanism

Wrapped Eth is present on the following networks: Arbitrum, Base, Binance Smart Chain, Ethereum, Linea, Optimism.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.

4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.

8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Linea Network uses a Zero-Knowledge Rollup (ZK-Rollup) architecture with a zkEVM for Ethereum compatibility, and its consensus is derived from Ethereum's own proof-of-stake security. While the Network has components like a sequencer for ordering transactions and a coordinator for network management, its consensus mechanism is fundamentally linked to the proof and verification process of zero-knowledge proofs and the security of the Ethereum mainnet. Instead of a typical decentralized consensus on a separate blockchain, the Network inherits its security and state finality from Ethereum.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

Wrapped Eth is present on the following networks: Arbitrum, Base, Binance Smart Chain, Ethereum, Linea, Optimism.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Like Ethereum, the Network uses a gas system, where gas is the unit of computational effort required to process a transaction. All gas fees on the Network are paid in Ether (ETH). The Network has a base fee that is designed to stabilize at 7 wei. The base fee still decreases or increases based on network traffic, similar to Ethereum, but it does not go below 7 wei. The Network does not require token staking for transaction validation purposes and thus provides no staking rewards. It does not offer incentives for running a full network node. It does charge fees collected by the sequencer for transaction processing. Those fees are paid in ETH, 20% of which are immediately burned while the remaining 80% are converted to Tokens and then burned.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, binance_smart_chain, ethereum, linea, optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information

regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Lido DAO Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Lido DAO Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	697.56573	kWh/a

Qualitative information

S.4 Consensus Mechanism

Lido DAO Token is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Solana, Terra Classic.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.

- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

Terra blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, which ensures fast, scalable, and secure transaction processing.

Core Components:

- Delegated Proof of Stake (DPoS):
  - Validators: A limited set of validators are responsible for validating transactions, proposing blocks, and securing the network. Validators are selected based on the amount of LUNA tokens staked, either directly or delegated by token holders.
  - Delegation: LUNA holders can delegate their tokens to validators, allowing them to participate in staking rewards without running their own validator nodes.
  - Rotational Leadership: Validators are selected in a round-robin manner to propose new blocks, ensuring fairness and efficiency in block production.
- Tendermint BFT (Byzantine Fault Tolerance):
  - Terra integrates the Tendermint Core consensus engine, providing fast block finality and resilience against up to one-third of malicious or faulty validators.
  - Finality: Transactions are confirmed once a block is added, reducing the risk of chain reorganizations and ensuring immediate finality.
  - Governance Integration: LUNA token holders participate in governance by voting on proposals related to protocol upgrades, parameter changes, and community decisions, aligning stakeholder incentives with network health.

S.5 Incentive Mechanisms and Applicable Fees

Lido DAO Token is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Solana, Terra Classic.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

The Terra blockchain's incentive structure is designed to reward network participants, ensure security, and sustain ecosystem growth, while its fee model aligns with its focus on scalability and cost-efficiency.

Incentive Mechanisms:

- Validators: Validators earn staking rewards for their role in securing the network and validating transactions. Rewards are distributed in LUNA tokens, derived from transaction fees and seigniorage revenue.
- Delegators: LUNA holders who delegate their tokens to validators receive a share of staking rewards, proportional to the amount delegated, incentivizing broad participation.
- Seigniorage Rewards: Validators and delegators benefit from seigniorage revenue, generated when new stablecoins (e.g., TerraUSD) are minted. A portion of this revenue is allocated to reward LUNA stakers.
- Stability Incentives: LUNA token holders are incentivized to stake and participate in governance to maintain the stability of Terra's ecosystem and its algorithmic stablecoins.
- Governance Participation Rewards: Validators and delegators have governance voting rights, enabling them to shape the network's future. Participation in governance aligns incentives with long-term ecosystem health.

Applicable Fees:

- Transaction Fees: Users pay fees in LUNA or stablecoins for transactions such as fund transfers, smart contract execution, and staking. These fees are distributed among validators and delegators, providing additional incentives for network security and functionality.
- Dynamic Fee Model: Transaction fees are dynamically adjusted based on network congestion and transaction size. This ensures efficient resource allocation while keeping fees affordable for users.
- Seigniorage Fee: A portion of revenue from stablecoin minting is directed to the treasury and distributed to stakers, reinforcing network participation and development.
- Burning Mechanism: A portion of fees and seigniorage revenue may be burned, reducing LUNA supply over time and contributing to its deflationary tokenomics.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum, solana, terra_classic is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

yieldbasis

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	yieldbasis	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	689.81828	kWh/a

Qualitative information

S.4 Consensus Mechanism

yieldbasis is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks,

but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

yieldbasis is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Magic Internet Money

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Magic Internet Money	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	679.49325	kWh/a

Qualitative information

S.4 Consensus Mechanism

Magic Internet Money is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Magic Internet Money is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.

- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom’s incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.

- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, fantom, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Beam



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Beam	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	656.92624	kWh/a

Qualitative information

S.4 Consensus Mechanism

Beam is present on the following networks: Avalanche, Binance Smart Chain, Ethereum.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Beam is present on the following networks: Avalanche, Binance Smart Chain, Ethereum.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the

energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ApeCoin



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ApeCoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	633.43898	kWh/a

Qualitative information

S.4 Consensus Mechanism

ApeCoin is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

ApeCoin is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.

- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

CoW Protocol Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	CoW Protocol Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	606.80512	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Arbitrum 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Arbitrum	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	579.05511	kWh/a

Qualitative information

S.4 Consensus Mechanism

Arbitrum is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Arbitrum is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

multibank

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	multibank	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	578.92968	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ether.fi governance token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ether.fi governance token	/
	2025-02-03	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	576.37620	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Render Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Render Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	565.44123	kWh/a

Qualitative information

S.4 Consensus Mechanism

Render Token is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Render Token is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Graph Token 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Graph Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	556.59309	kWh/a

Qualitative information

S.4 Consensus Mechanism

Graph Token is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.

- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Graph Token is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

fight

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	fight	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	553.42121	kWh/a

Qualitative information

S.4 Consensus Mechanism

fight is present on the following networks: Binance Smart Chain, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives

7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

fight is present on the following networks: Binance Smart Chain, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Bonk 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bonk	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	542.51041	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Synapse

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Synapse	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	542.39990	kWh/a

Qualitative information

S.4 Consensus Mechanism

Synapse is present on the following networks: Arbitrum, Aurora, Avalanche, Binance Smart Chain, Boba Network, Ethereum, Fantom, Harmony One, Moonriver, Optimism, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Aurora functions as an Ethereum Virtual Machine (EVM) compatible environment operating atop the NEAR Protocol. It does not possess an independent consensus mechanism but relies on NEAR's Proof-of-Stake (PoS) consensus for transaction validation and network security.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.

- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Boba Network operates as an Ethereum Layer 2 solution using an Optimistic Rollup architecture to improve scalability and reduce transaction costs.

Core Components:

- Optimistic Rollup: Processes transactions off-chain, aggregates them, and submits condensed proofs to the Ethereum mainnet for finalization.
- Sequencer Role: A sequencer organizes and bundles transactions off-chain before submitting the batched data to Ethereum. This enhances transaction throughput and reduces latency.
- Fraud Proofs: Maintains security by allowing users to challenge suspicious transactions. If a transaction is deemed fraudulent, it is corrected on the mainnet, ensuring integrity.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):
   - Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.
   - Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.

2. Sharding with PBFT Finality:
   - Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
   - Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

Moonriver operates on a Proof of Stake (PoS) consensus mechanism, enhanced by Polkadot's Nominated Proof of Stake (NPoS) model. This structure ensures secure, scalable, and decentralized transaction processing, leveraging the robust Substrate framework.

Core Components:

- Nominated Proof of Stake (NPoS):
  Validators are selected through staking by token holders, known as nominators, who delegate their MOVR tokens to trusted validator nodes. Validators with higher stakes and nominations are chosen to validate blocks and secure the network.
- Collator Nodes:
  Moonriver employs collator nodes, responsible for aggregating transactions into blocks and submitting them to the Polkadot Relay Chain for final validation. Collators ensure fast block production while relying on Polkadot's shared security.
- Byzantine Fault Tolerance (BFT):
  Moonriver integrates BFT properties to handle network disruptions and maintain consensus even if some validators act maliciously or become unavailable.
- Seamless Interoperability:
  As a parachain within the Polkadot ecosystem, Moonriver benefits from Polkadot's cross-chain messaging protocols, enabling secure and efficient interoperability with other parachains and external blockchains.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.

- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Synapse is present on the following networks: Arbitrum, Aurora, Avalanche, Binance Smart Chain, Boba Network, Ethereum, Fantom, Harmony One, Moonriver, Optimism, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The Aurora network utilizes the AURORA token for governance and staking purposes. Token holders can participate in network governance through the AuroraDAO, influencing protocol decisions and developments.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network’s inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The Boba Network incentivizes participation and ensures affordability with flexible fee payment options and staking rewards.

Incentive Mechanisms:

- Staking Rewards: BOBA token holders can stake their tokens to participate in governance and earn staking rewards, encouraging long-term engagement and network growth.
- Sequencer Revenue: The sequencer earns fees for bundling and submitting transactions, incentivizing efficient network operation.

Applicable Fees:

- Dual-Fee Token System: Users can pay transaction fees in BOBA tokens or the base blockchain token (e.g., ETH), offering flexibility.
- Low Transaction Costs: By batching transactions off-chain, Boba significantly reduces the gas fees users pay compared to directly using the Ethereum mainnet.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom’s incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.

- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.
2. Decentralization Penalty for High Stake:
   Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:
   Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

Moonriver's incentive model ensures active participation from validators, nominators, and developers while maintaining network security and usability.

Incentive Mechanisms:

- Staking Rewards: Validators and nominators earn MOVR tokens for securing the network and validating transactions.
- Collator Rewards: Collators, who propose blocks, are rewarded with MOVR tokens.
- Inflationary Rewards: New MOVR tokens are minted to fund staking and ecosystem development.
- Developer Incentives: A portion of rewards supports dApp development and ecosystem growth.

Applicable Fees:

- Transaction Fees: Paid in MOVR for transfers and smart contract interactions, distributed to validators and collators.
- Gas Fees: Calculated based on transaction complexity, ensuring predictable costs.
- Fee Burning: A portion of fees is burned, reducing token supply over time to support value retention.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they

have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:
- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:
- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:
Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:
State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, aurora, avalanche, binance_smart_chain, boba_network, ethereum, fantom, harmony_one, moonriver, optimism, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the

Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

World Mobile Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	World Mobile Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	517.94248	kWh/a

Qualitative information

S.4 Consensus Mechanism

World Mobile Token is present on the following networks: Arbitrum, Base, Binance Smart Chain, Cardano, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Core Components: Cardano uses the Ouroboros consensus mechanism, a Proof of Stake (PoS) protocol designed for scalability, security, and energy efficiency.

Core Concepts:

1. Proof of Stake (PoS): Validators (called slot leaders) are selected based on the amount of ADA they have staked, rather than solving complex computational puzzles. Validators propose and validate blocks, which are added to the blockchain.
2. Epochs and Slot Leaders: Cardano divides time into epochs (fixed time periods), each of which is subdivided into slots. Slot leaders are selected for each slot to validate and propose blocks. Slot leaders are chosen randomly based on the amount of ADA staked. More stake increases the probability of being selected. Validators are responsible for confirming transactions during their slot and passing the block to the next slot leader.
3. Delegation and Staking Pools: ADA holders can delegate their tokens to staking pools, which increases the pool's chances of being selected to validate a block. The pool operator and delegators share the rewards based on their stakes. This system ensures that participants who do not want to operate a full validator node can still earn rewards and contribute to network security by supporting trusted staking pools.
4. Security and Adversary Resistance: Ouroboros ensures security even in the presence of potential attacks. It assumes that adversaries may attempt to propagate alternative chains or send arbitrary messages. The protocol is secure as long as more than 51% of the staked ADA is controlled by honest participants. Settlement Delay: To protect against adversarial attacks, the new slot leader must consider the last few blocks as transient. Only the blocks preceding these are treated as finalized, ensuring that chain finality is secure against manipulation attempts. This mechanism also allows participants to temporarily go offline and resynchronize as long as they are not disconnected for more than the settlement delay period.
5. Chain Selection: Cardano's nodes adopt the longest valid chain rule: each node stores a local copy of the blockchain and replaces it with any discovered valid, longer chain. This ensures that all nodes eventually converge on a single version of the blockchain, maintaining network consistency.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

World Mobile Token is present on the following networks: Arbitrum, Base, Binance Smart Chain, Cardano, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.

- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Cardano uses incentive mechanisms to ensure network security and decentralization through staking rewards, slashing mechanisms, and transaction fees.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   - Validators, known as slot leaders, secure the network by validating transactions and creating new blocks. To participate, validators must stake ADA, and those with larger stakes are more likely to be selected as slot leaders.
   - Validators are rewarded with newly minted ADA and transaction fees for successfully producing blocks and validating transactions.
   - Delegators, who may not wish to run a validator node, can delegate their ADA to staking pools. By doing so, they contribute to the network's security and earn a share of the rewards earned by the pool. The rewards are distributed proportionally based on the amount of ADA delegated.
2. Slashing Mechanism:
   - To prevent malicious behavior, Cardano employs a slashing mechanism. Validators who act dishonestly, fail to validate transactions properly, or produce incorrect blocks face penalties that involve the slashing of a portion of their staked ADA.
   - This provides strong economic incentives for validators to act honestly and ensures the network's integrity and security.
3. Delegation and Pool Operation:
   - Staking pools can charge operation fees (a margin on rewards) to maintain their infrastructure. This includes fixed costs set by pool operators. Delegators earn rewards after pool fees are deducted, providing a balanced incentive for both operators and delegators to participate actively.
   - Rewards are distributed at the end of each epoch, where staking pool performance and participation determine the distribution of ADA rewards to all stakeholders.

Applicable Fees:

1. Transaction Fees:
   - Transaction fees on Cardano are paid in ADA and are generally low. They are calculated based on the size of the transaction and the network's current demand. These fees are paid to validators for including transactions in new blocks.
   - The fee formula is: a + b × size, where a is a constant (typically 0.155381 ADA), b is a coefficient related to the transaction size (0.000043946 ADA/byte), and size refers to the transaction size in bytes. This ensures that the fee adapts based on network load and the size of each transaction.
2. Staking Pool Fees:
   - Staking pool operators charge operational costs and a margin fee, which covers the cost of running and maintaining the staking pool. These fees vary between pools but ensure that operators can continue to provide their services while offering rewards to delegators.
   - After the operator's fee, the remaining rewards are distributed among the delegators based on the size of their stake.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, binance_smart_chain, cardano, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Gala 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Gala	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	511.12071	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Bancor

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bancor	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	498.23844	kWh/a

Qualitative information

S.4 Consensus Mechanism

Bancor is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Bancor is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

picasso

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	picasso	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	497.03921	kWh/a

Qualitative information

S.4 Consensus Mechanism

picasso is present on the following networks: Ethereum, Osmosis, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.

- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

picasso is present on the following networks: Ethereum, Osmosis, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, osmosis, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Wayfinder Prompt

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Wayfinder Prompt	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	497.01708	kWh/a

Qualitative information

S.4 Consensus Mechanism

Wayfinder Prompt is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.

6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Wayfinder Prompt is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Aethir Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Aethir Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	495.72893	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Maple Finance

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Maple Finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	475.65577	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Non Playable Coin



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Non Playable Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	474.81138	kWh/a

Qualitative information

S.4 Consensus Mechanism

Non Playable Coin is present on the following networks: Base, Binance Smart Chain, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Non Playable Coin is present on the following networks: Base, Binance Smart Chain, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Reserve Rights

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Reserve Rights	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	471.24987	kWh/a

Qualitative information

S.4 Consensus Mechanism

Reserve Rights is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only

validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Reserve Rights is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy

consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Compound

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Compound	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	466.54234	kWh/a

Qualitative information

S.4 Consensus Mechanism

Compound is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators

and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus

significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH

sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Compound is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain’s incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders’ economic interests.

- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.
3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.
2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, gnosis_chain, near_protocol, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Kamino Finance

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Kamino Finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	459.58544	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Wrapped Axelar

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Wrapped Axelar	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	454.66053	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

brevis

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	brevis	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	454.10471	kWh/a

Qualitative information

S.4 Consensus Mechanism

brevis is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an

entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

brevis is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result

is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SAND

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SAND	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/

Field	Value	Unit
S.8 Energy consumption	450.60051	kWh/a

Qualitative information

S.4 Consensus Mechanism

SAND is present on the following networks: Ethereum, Polygon, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.

- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

SAND is present on the following networks: Ethereum, Polygon, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number

of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Virtual Protocol

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Virtual Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	445.28687	kWh/a

Qualitative information

S.4 Consensus Mechanism

Virtual Protocol is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Virtual Protocol is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SushiSwap 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SushiSwap	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	445.00492	kWh/a

Qualitative information

S.4 Consensus Mechanism

SushiSwap is present on the following networks: Arbitrum, Ethereum, Fantom, Gnosis Chain, Harmony One, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks,

but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):
   - Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.
   - Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.

2. Sharding with PBFT Finality:
   - Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
   - Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

SushiSwap is present on the following networks: Arbitrum, Ethereum, Fantom, Gnosis Chain, Harmony One, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.

- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.

- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.
2. Decentralization Penalty for High Stake:
   Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:
   Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.

- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, fantom, gnosis_chain, harmony_one, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

galxe

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	galxe	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	443.74621	kWh/a

Qualitative information

S.4 Consensus Mechanism

galxe is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

galxe is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Gravity

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Gravity	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	442.74431	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon

Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Euler

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Euler	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	441.18385	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

JUST



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	JUST	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	440.18187	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make

assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

VeThor

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	VeThor	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	439.40160	kWh/a

Qualitative information

S.4 Consensus Mechanism

VeChain employs a Proof of Authority (PoA) 2.0 consensus mechanism, where trusted Authority Masternodes are responsible for validating transactions, providing both security and efficiency for enterprise applications.

Core Components of VeChain's Consensus:

1. Proof of Authority (PoA) 2.0:
   Trusted Authority Masternodes: VeChain's PoA 2.0 relies on a set of pre-approved Authority Masternodes to validate blocks and confirm transactions. These nodes are selected based on their reputation and reliability, ensuring network integrity and trustworthiness.
2. Finality and Security:
   Immediate Transaction Finality: Once a block is validated under PoA 2.0, it is final, reducing the likelihood of forks. This immediate finality enhances the security and reliability of the network, making it suitable for enterprise-grade applications.

S.5 Incentive Mechanisms and Applicable Fees

VeChain's incentive model utilizes a dual-token system to support staking, transaction processing, and economic stability, helping to ensure predictable costs for network users.

Incentive Mechanisms:

1. Dual-Token Model:
   - VET (VeChain Token): VET is used primarily for value transfer and staking on the network. VET holders can stake their tokens to generate VTHO, which serves as "gas" for transactions.

- VTHO (VeThor Token): VTHO is used to pay for transaction fees, providing a buffer against fluctuations in VET's market price. This setup decouples transaction costs from VET's volatility, allowing for stable and predictable transaction fees.

2. Staking Rewards:

VET Staking to Generate VTHO: By staking VET, holders automatically generate VTHO tokens, which can be used to cover transaction costs. This staking mechanism incentivizes VET holders to participate in the network and secure its operations.

Applicable Fees:

Transaction Fees in VTHO: Transaction fees on VeChain are paid in VTHO, keeping costs stable and predictable for users regardless of VET's market price. This predictable fee model makes the network appealing for enterprises and high-volume applications.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) vechain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

yooldo

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	yooldo	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	433.94277	kWh/a

Qualitative information

S.4 Consensus Mechanism

yooldo is present on the following networks: Binance Smart Chain, Linea.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The Linea Network uses a Zero-Knowledge Rollup (ZK-Rollup) architecture with a zkEVM for Ethereum compatibility, and its consensus is derived from Ethereum's own proof-of-stake security. While the Network has components like a sequencer for ordering transactions and a coordinator for network management, its consensus mechanism is fundamentally linked to the proof and

verification process of zero-knowledge proofs and the security of the Ethereum mainnet. Instead of a typical decentralized consensus on a separate blockchain, the Network inherits its security and state finality from Ethereum.

S.5 Incentive Mechanisms and Applicable Fees

yooldo is present on the following networks: Binance Smart Chain, Linea.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Like Ethereum, the Network uses a gas system, where gas is the unit of computational effort required to process a transaction. All gas fees on the Network are paid in Ether (ETH). The Network has a base fee that is designed to stabilize at 7 wei. The base fee still decreases or increases based on network traffic, similar to Ethereum, but it does not go below 7 wei. The Network does not require token staking for transaction validation purposes and thus provides no staking rewards. It does not offer incentives for running a full network node. It does charge fees collected by the sequencer for transaction processing. Those fees are paid in ETH, 20% of which are immediately burned while the remaining 80% are converted to Tokens and then burned.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, linea is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Synthetix Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Synthetix Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	433.47747	kWh/a

Qualitative information

S.4 Consensus Mechanism

Synthetix Network is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Fantom, Near Protocol, Optimism, Polygon, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.

2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.

2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Synthetix Network is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Fantom, Near Protocol, Optimism, Polygon, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.
3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.
2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, fantom, near_protocol, optimism, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

origintrail

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	origintrail	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	432.95599	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Raydium

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Raydium	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	419.19344	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

JasmyCoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	JasmyCoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	387.06435	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Arkham 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Arkham	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	384.58181	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Numeraire

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Numeraire	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	379.47486	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Decentraland

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Decentraland	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	378.91931	kWh/a

Qualitative information

S.4 Consensus Mechanism

Decentraland is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Decentraland is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

FLOKI

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	FLOKI	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	378.38614	kWh/a

Qualitative information

S.4 Consensus Mechanism

FLOKI is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

FLOKI is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Space And Time

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Space And Time	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/

Field	Value	Unit
S.8 Energy consumption	377.49427	kWh/a

Qualitative information

S.4 Consensus Mechanism

Space And Time is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Space And Time is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Immutable X

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Immutable X	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	377.41789	kWh/a

Qualitative information

S.4 Consensus Mechanism

Immutable X is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Immutable X is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SUN



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SUN	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	377.01968	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Basic Attention Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Basic Attention Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	376.85970	kWh/a

Qualitative information

S.4 Consensus Mechanism

Basic Attention Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and

the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Basic Attention Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.
3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.
2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, gnosis_chain, near_protocol, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Vision ETH

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Vision ETH	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	373.51675	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

StargateToken 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	StargateToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	372.73187	kWh/a

Qualitative information

S.4 Consensus Mechanism

StargateToken is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.

6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

StargateToken is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, fantom, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

JoeToken

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	JoeToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	370.24055	kWh/a

Qualitative information

S.4 Consensus Mechanism

JoeToken is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain.

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Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

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Core Components:

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2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
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8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

JoeToken is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely

economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Humanity Protocol

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Humanity Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	366.11448	kWh/a

Qualitative information

S.4 Consensus Mechanism

Humanity Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Humanity Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy

consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Sahara AI

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Sahara AI	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	365.01371	kWh/a

Qualitative information

S.4 Consensus Mechanism

Sahara AI is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Sahara AI is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Ethereum Name Service



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ethereum Name Service	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	363.37377	kWh/a

Qualitative information

S.4 Consensus Mechanism

Ethereum Name Service is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.

- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Ethereum Name Service is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Radicle

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Radicle	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	355.00405	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Optimism



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Optimism	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	349.84646	kWh/a

Qualitative information

S.4 Consensus Mechanism

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.

4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

OFFICIAL TRUMP 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	OFFICIAL TRUMP	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	346.19035	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.

- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of

the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Dolomite

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Dolomite	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	339.39947	kWh/a

Qualitative information

S.4 Consensus Mechanism

Dolomite is present on the following networks: Arbitrum, Berachain, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.

5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Berachain utilizes a unique consensus mechanism called Proof-of-Liquidity (PoL). In this system, validators secure the network by staking the native gas token, $BERA. The likelihood of a validator being selected to propose a block is proportional to the amount of $BERA they have staked. Upon successfully proposing a block, validators receive rewards in the form of $BGT (Bera Governance Token). The amount of $BGT awarded is influenced by the level of $BGT delegation they have received from other participants. This mechanism aligns the incentives of validators, protocols, and users, contributing to the overall long-term health of the chain.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Dolomite is present on the following networks: Arbitrum, Berachain, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.

- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

In Berachain's economic model, validators and delegators are incentivized through a combination of staking rewards and protocol-provided incentives. Validators earn $BGT rewards for block production, with the reward size determined by their boost, which is a percentage calculated from the validator's $BGT boost out of the total $BGT boosted to all validators. Validators can direct their $BGT emissions to whitelisted Reward Vaults of their choosing, and in exchange, they receive protocol-provided incentives from these Reward Vaults. Delegators, by staking their $BGT with validators, can influence the validator's boost and share in the rewards. Transaction fees on the network are paid in $BERA and are burned, removing them from the circulating supply. This structure ensures that all participants are motivated to contribute to the network's security and efficiency.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, berachain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used

and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Coq Inu

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Coq Inu	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	335.26314	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.

- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

S.5 Incentive Mechanisms and Applicable Fees

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network’s inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Newton Protocol

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Newton Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	331.47407	kWh/a

Qualitative information

S.4 Consensus Mechanism

Newton Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Newton Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Treehouse

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Treehouse	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	330.34552	kWh/a

Qualitative information

S.4 Consensus Mechanism

Treehouse is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks,

but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Treehouse is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Maker

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Maker	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	321.54180	kWh/a

Qualitative information

S.4 Consensus Mechanism

Maker is present on the following networks: Avalanche, Binance Smart Chain, Ethereum.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently

active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Maker is present on the following networks: Avalanche, Binance Smart Chain, Ethereum.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

RedStone

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	RedStone	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	315.63796	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

yearn finance

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	yearn finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	315.29017	kWh/a

Qualitative information

S.4 Consensus Mechanism

yearn finance is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Gnosis Chain, Huobi, Near Protocol, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks,

but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Key Features of HECO's Consensus Mechanism:

1. Validator Selection: HECO supports up to 21 validators, selected based on their stake in the network.
2. Transaction Processing: Validators are responsible for processing transactions and adding blocks to the blockchain.

3. Transaction Finality: The consensus mechanism ensures quick finality, allowing for rapid confirmation of transactions.
4. Energy Efficiency: By utilizing PoS elements, HECO reduces energy consumption compared to traditional Proof-of-Work systems.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

yearn finance is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Gnosis Chain, Huobi, Near Protocol, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Incentive Mechanism:

1. Validator Rewards:
   Validators are selected based on their stake in the network. They process transactions and add blocks to the blockchain. Validators receive rewards in the form of transaction fees for their role in maintaining the blockchain's integrity.
2. Staking Participation:
   Users can stake Huobi Token (HT) to become validators or delegate their tokens to existing validators. Staking helps secure the network and, in return, participants receive a portion of the transaction fees as rewards.

Applicable Fees:

1. Transaction Fees (Gas Fees):
   Users pay gas fees in HT tokens to execute transactions and interact with smart contracts on the HECO network. These fees compensate validators for processing and validating transactions.
2. Smart Contract Execution Fees:
   Deploying and interacting with smart contracts incur additional fees, which are also paid in HT tokens. These fees cover the computational resources required to execute contract code.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.
3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, fantom, gnosis_chain, huobi, near_protocol, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Perpetual

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Perpetual	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	312.65891	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon

Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

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The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

StarkNet Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	StarkNet Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	310.24729	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Plume 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Plume	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	305.56592	kWh/a

Qualitative information

S.4 Consensus Mechanism

Plume is present on the following networks: Ethereum, Plume.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Plume is present on the following networks: Ethereum, Plume.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Bounce Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bounce Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	304.03993	kWh/a

Qualitative information

S.4 Consensus Mechanism

Bounce Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA).

This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Bounce Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Ankr

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ankr	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	303.42349	kWh/a

Qualitative information

S.4 Consensus Mechanism

Ankr is present on the following networks: Arbitrum, Avalanche, Binance Beacon Chain, Binance Smart Chain, Ethereum, Fantom, Optimism, Polygon, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Beacon Chain operated on a Delegated Proof of Stake (DPoS) consensus mechanism before its operations were discontinued in fall 2024 and its migration to Binance Smart Chain; validators were elected by token holders through staking and voting, limiting active participation to a manageable number of nodes while maintaining decentralization; validators were selected based on the staking weight of their delegators, ensuring stakeholder interests were proportionally represented in the validation process; regular validator rotation was implemented to promote fairness and decentralization by allowing multiple participants to contribute to the network; the system was designed to tolerate some degree of validator failures while maintaining the network's operational integrity, ensuring resilience.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.

- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Ankr is present on the following networks: Arbitrum, Avalanche, Binance Beacon Chain, Binance Smart Chain, Ethereum, Fantom, Optimism, Polygon, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network’s inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.

- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

The Binance Beacon Chain incentivized validators and ensured fee transparency before its migration to Binance Smart Chain; validators were rewarded solely through transaction fees, with no block rewards provided, aligning incentives with network usage and transaction volume; transaction fees were calculated and displayed upfront, ensuring clarity for users and promoting trust in the fee structure; a portion of transaction fees collected in BNB was burned, reducing the overall token supply and contributing to a deflationary economic model.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom’s incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom’s staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees

associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_beacon_chain, binance_smart_chain, ethereum, fantom, optimism, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SuperVerse

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SuperVerse	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	296.20318	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

BIO

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	BIO	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	280.20951	kWh/a

Qualitative information

S.4 Consensus Mechanism

BIO is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only

validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

BIO is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

kgen

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	kgen	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	276.14416	kWh/a

Qualitative information

S.4 Consensus Mechanism

kgen is present on the following networks: Aptos Coin, Binance Smart Chain.

Aptos utilizes a Proof-of-Stake approach combined with a BFT consensus protocol to ensure high throughput, low latency, and secure transaction processing.

Core Components:

- Parallel Execution: Transactions are processed concurrently using Block-STM, a parallel execution engine, enabling high performance and scalability.
- Leader-Based BFT: A leader is selected among validators to propose blocks, while others validate and finalize transactions.
- Dynamic Validator Rotation: Validators are rotated regularly, enhancing decentralization and preventing collusion.
- Instant Finality: Transactions achieve finality once validated, ensuring that they are irreversible.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA).

This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

kgen is present on the following networks: Aptos Coin, Binance Smart Chain.

Incentive Mechanism:

- Validator Rewards: Validators earn rewards in APT tokens for validating transactions and producing blocks. Rewards are distributed proportionally based on the stake of validators and their delegators.
- Delegator Participation: APT token holders can delegate their tokens to validators, earning a share of the staking rewards without running their own nodes.

- Slashing Mechanism: Validators face penalties, such as losing staked tokens, for malicious actions or prolonged inactivity, ensuring accountability and network security.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in APT tokens for sending transactions and interacting with smart contracts.
- Dynamic Fee Adjustment: Fees are dynamically adjusted based on network activity and resource usage, ensuring cost efficiency and preventing congestion.
- Fee Distribution: Transaction fees are distributed among validators and delegators, providing an additional incentive for network participation.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) aptos_coin, binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Yield Guild Games Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Yield Guild Games Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	272.91962	kWh/a

Qualitative information

S.4 Consensus Mechanism

Yield Guild Games Token is present on the following networks: Ethereum, Harmony One, Ronin, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):
   - Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.
   - Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.
2. Sharding with PBFT Finality:
   - Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
   - Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

Ronin utilizes a Delegated Proof of Stake (DPoS) consensus mechanism, where community-elected validators are responsible for securing the network and validating transactions.

Core Components of Ronin's Consensus:

1. Delegated Proof of Stake (DPoS):
   - Community Voting for Validator Selection: RON token holders delegate their tokens to vote for validators, who are then selected to produce blocks, validate transactions, and maintain network security. Validators with the most votes are chosen to participate in consensus.
   - Periodic Validator Rotation: Validators are regularly rotated based on community votes, enhancing decentralization and preventing long-term control by any single validator group. This rotation supports both security and fairness.
2. Incentive-Driven Voting System:
   Alignment with Community Interests: The voting system ensures that validators remain aligned with community goals. Validators that fail to perform adequately or act against network interests may lose votes and be replaced by more trusted participants.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Yield Guild Games Token is present on the following networks: Ethereum, Harmony One, Ronin, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.
2. Decentralization Penalty for High Stake:
   Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:
   Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

Ronin's incentive model combines rewards, slashing mechanisms, and governance features to support network security and encourage active community participation.

Incentive Mechanisms:

1. Rewards for Validators and Delegators:
   - Staking Rewards for Validators: Validators earn RON tokens as rewards for successfully producing blocks and validating transactions. These rewards incentivize validators to fulfill their duties diligently, maintaining network stability.
   - Delegator Rewards: Delegators who stake their tokens with selected validators also earn a portion of the staking rewards. This sharing of rewards promotes broad participation from token holders in network security and governance.

2. Slashing Mechanism for Accountability:
   - Penalty for Malicious Behavior: A slashing mechanism penalizes validators who act dishonestly or fail to meet performance standards by cutting a portion of their staked RON tokens. This deters misbehavior and encourages responsible participation.
   - Delegator Risk: Delegators who stake with misbehaving validators are also subject to slashing, which encourages them to choose trustworthy validators and monitor performance carefully.
3. Governance Participation:
   RON Token for Governance: Beyond staking and transaction fees, the RON token enables token holders to participate in governance. This includes voting on network upgrades, validator selection, and other protocol decisions, giving token holders a voice in network direction and policy.

Applicable Fees:

Transaction Fees: Fees are paid in RON tokens, contributing to validator rewards and helping to maintain network operations. These fees are designed to be affordable, ensuring accessibility for users while supporting validators' roles.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, harmony_one, ronin, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Animecoin



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Animecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	271.92675	kWh/a

Qualitative information

S.4 Consensus Mechanism

Animecoin is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Animecoin is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.

- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:
- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:
- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using

empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Turbo

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Turbo	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	260.38359	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ren 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ren	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	259.07205	kWh/a

Qualitative information

S.4 Consensus Mechanism

ren is present on the following networks: Ethereum, Fantom, Gnosis Chain, Near Protocol.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

S.5 Incentive Mechanisms and Applicable Fees

ren is present on the following networks: Ethereum, Fantom, Gnosis Chain, Near Protocol.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom’s incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom’s staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the

validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.
2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, fantom, gnosis_chain, near_protocol is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

XY Oracle

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	XY Oracle	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	254.35455	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all

implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

harrypotterobamasonic 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	harrypotterobamasonic	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	253.60219	kWh/a

Qualitative information

S.4 Consensus Mechanism

harrypotterobamasonic is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

harrypotterobamasonic is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

0x Protocol Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	0x Protocol Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	251.48397	kWh/a

Qualitative information

S.4 Consensus Mechanism

0x Protocol Token is present on the following networks: Avalanche, Ethereum, Gnosis Chain, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

0x Protocol Token is present on the following networks: Avalanche, Ethereum, Gnosis Chain, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, ethereum, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Rocket Pool



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Rocket Pool	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	243.36042	kWh/a

Qualitative information

S.4 Consensus Mechanism

Rocket Pool is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.

- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Rocket Pool is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

zigchain



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	zigchain	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	242.30199	kWh/a

Qualitative information

S.4 Consensus Mechanism

zigchain is present on the following networks: Binance Smart Chain, Ethereum, Polygon, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives

7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.

- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

zigchain is present on the following networks: Binance Smart Chain, Ethereum, Polygon, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the

hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Liquity

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Liquity	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	241.16159	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Livepeer

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Livepeer	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	238.11161	kWh/a

Qualitative information

S.4 Consensus Mechanism

Livepeer is present on the following networks: Ethereum, Harmony One.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):
   - Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.
   - Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.
2. Sharding with PBFT Finality:
   - Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
   - Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

S.5 Incentive Mechanisms and Applicable Fees

Livepeer is present on the following networks: Ethereum, Harmony One.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
   ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.
2. Decentralization Penalty for High Stake:
   Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:
   Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, harmony_one is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Useless Coin 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Useless Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	233.74041	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the

network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Zora

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Zora	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	233.12898	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

BitTorrent New 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	BitTorrent New	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	232.78864	kWh/a

Qualitative information

S.4 Consensus Mechanism

BitTorrent New is present on the following networks: Binance Smart Chain, Ethereum, Tron.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added

to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

BitTorrent New is present on the following networks: Binance Smart Chain, Ethereum, Tron.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Moca

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Moca	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	228.89072	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

rekt



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	rekt	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	225.09910	kWh/a

Qualitative information

S.4 Consensus Mechanism

rekt is present on the following networks: Base, Binance Smart Chain, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

rekt is present on the following networks: Base, Binance Smart Chain, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be

withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

infinit

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	infinit	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	222.54087	kWh/a

Qualitative information

S.4 Consensus Mechanism

infinit is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA).

This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

infinit is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

tanssi

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	tanssi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	215.91055	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Step Finance

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Step Finance	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	212.47016	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

usual



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	usual	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	210.23616	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Spell Token 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Spell Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	208.88522	kWh/a

Qualitative information

S.4 Consensus Mechanism

Spell Token is present on the following networks: Arbitrum, Avalanche, Ethereum, Fantom.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.

- Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

S.5 Incentive Mechanisms and Applicable Fees

Spell Token is present on the following networks: Arbitrum, Avalanche, Ethereum, Fantom.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, ethereum, fantom is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Global Dollar

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Global Dollar	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	207.68269	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

AltLayer Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	AltLayer Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	207.61091	kWh/a

Qualitative information

S.4 Consensus Mechanism

AltLayer Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

AltLayer Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

tokenfi

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	tokenfi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	206.89610	kWh/a

Qualitative information

S.4 Consensus Mechanism

tokenfi is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

tokenfi is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ssv network



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ssv network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	206.40595	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon

Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Safe Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Safe Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	201.65365	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Audius



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Audius	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	199.78538	kWh/a

Qualitative information

S.4 Consensus Mechanism

Audius is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.

- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Audius is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain’s incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders’ economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used

and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

double_zero

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	double_zero	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	198.80867	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators.

This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Limewire



Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Limewire	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	198.79690	kWh/a

Qualitative information

S.4 Consensus Mechanism

Limewire is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Limewire is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Apu Apustajasee 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Apu Apustajasee	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	192.78741	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon

Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Layer3

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Layer3	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	186.75837	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

zero_base 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	zero_base	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	179.84682	kWh/a

Qualitative information

S.4 Consensus Mechanism

zero_base is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

zero_base is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Helium

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Helium	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	178.67242	kWh/a

Qualitative information

S.4 Consensus Mechanism

Helium is present on the following networks: Helium, Solana.

Helium operates on a unique consensus model called Proof of Coverage (PoC), optimized for decentralized, location-based verification and low-power wireless IoT networks.

Core Components of Helium's Consensus:

1. Proof of Coverage (PoC):
   - Hotspot Verification: PoC is a consensus protocol designed specifically for Helium, ensuring that network nodes, known as hotspots, provide valid wireless coverage in their claimed location.
   - Challenge System: Hotspots are randomly selected to participate in PoC challenges involving three roles:
     - Challenger: Initiates the verification process.
     - Transmitter: Broadcasts signals to other hotspots.
     - Witness: Confirms signal receipt, verifying that coverage is active in a specific location.
   - Off-Chain Processing on Solana: Helium's PoC is processed off-chain on Solana, with results stored on Solana's blockchain to reduce on-chain resource usage while maintaining decentralized verification. Solana itself is secured through a Proof-of-Stake (PoS) mechanism.
2. LongFi Protocol: Helium utilizes LongFi, a protocol that integrates LoRaWAN technology with blockchain. This protocol supports low-power, long-range communication ideal for IoT devices, optimizing for low bandwidth and extensive range applications.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Helium is present on the following networks: Helium, Solana.

Helium's incentive structure rewards hotspot operators for verifying coverage and transmitting IoT data, aligning rewards with network participation and actual service provision.

Incentive Mechanisms:

1. Hotspot Operator Rewards:
   Hotspot operators earn Helium's native HNT tokens as rewards for participating in PoC challenges and transmitting IoT data. The amount of HNT earned depends on the PoC verification results and the volume of data transmitted through their hotspots.
2. Solana Validators:
   Validators on Solana's network process Helium transactions and receive staking rewards in Solana's native token, SOL, contributing to Helium's transaction verification.

Applicable Fees:

- Usage Fees with DC: IoT device operators pay for network usage with Data Credits, which are generated by burning HNT tokens. This model decouples usage costs from HNT's market price, keeping transaction costs stable.
- HNT Burn Mechanism: The burning of HNT to generate Data Credits ties network utility to HNT token demand, creating a feedback loop that supports token stability and incentivizes participation in network services.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital

Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

LCX ※

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	LCX	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	177.18284	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

PowerLedger

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	PowerLedger	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	175.90610	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

COTI Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	COTI Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	174.93113	kWh/a

Qualitative information

S.4 Consensus Mechanism

COTI Token is present on the following networks: Binance Beacon Chain, Binance Smart Chain, Ethereum.

Binance Beacon Chain operated on a Delegated Proof of Stake (DPoS) consensus mechanism before its operations were discontinued in fall 2024 and its migration to Binance Smart Chain; validators were elected by token holders through staking and voting, limiting active participation to a manageable number of nodes while maintaining decentralization; validators were selected based on the staking weight of their delegators, ensuring stakeholder interests were proportionally represented in the validation process; regular validator rotation was implemented to promote fairness and decentralization by allowing multiple participants to contribute to the network; the system was designed to tolerate some degree of validator failures while maintaining the network's operational integrity, ensuring resilience.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

COTI Token is present on the following networks: Binance Beacon Chain, Binance Smart Chain, Ethereum.

The Binance Beacon Chain incentivized validators and ensured fee transparency before its migration to Binance Smart Chain; validators were rewarded solely through transaction fees, with no block rewards provided, aligning incentives with network usage and transaction volume; transaction fees were calculated and displayed upfront, ensuring clarity for users and promoting trust in the fee structure; a portion of transaction fees collected in BNB was burned, reducing the overall token supply and contributing to a deflationary economic model.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_beacon_chain, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Pudgy Penguins 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Pudgy Penguins	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	172.83445	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Nosana

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Nosana	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	172.51272	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the

network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ARPA Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ARPA Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	172.16331	kWh/a

Qualitative information

S.4 Consensus Mechanism

ARPA Token is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

ARPA Token is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the

token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

corn 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	corn	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	172.15493	kWh/a

Qualitative information

S.4 Consensus Mechanism

corn is present on the following networks: Corn, Ethereum.

Corn is an Ethereum Layer 2 network built using the Arbitrum Orbit framework, designed to enhance Bitcoin's utility within decentralized finance (DeFi). The network employs a dual-security model: it inherits Ethereum's security through Arbitrum's rollup technology.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

corn is present on the following networks: Corn, Ethereum.

The Corn network utilizes a dual-token system comprising $CORN and BTCN. BTCN serves as the gas token for transaction fees, allowing users to pay fees in a Bitcoin-equivalent asset. $CORN functions as the governance and incentive token within the ecosystem.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) corn, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Quantoz USDQ

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Quantoz USDQ	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	171.86310	kWh/a

Qualitative information

S.4 Consensus Mechanism

Quantoz USDQ is present on the following networks: Algorand, Ethereum, Polygon.

The Algorand blockchain utilizes a consensus mechanism termed Pure Proof-of-Stake (PPoS). Consensus, in this context, describes the method by which blocks are selected and appended to the blockchain. Algorand employs a verifiable random function (VRF) to select leaders who propose blocks for each round.

Upon block proposal, a pseudorandomly selected committee of voters is chosen to evaluate the proposal. If a supermajority of these votes are from honest participants, the block is certified. What makes this algorithm a Pure Proof of Stake is that users are chosen for committees based on the number of algos in their accounts. This system leverages random committee selection to maintain high performance and inclusivity within the network.

The consensus process involves three stages:

1. Propose: A leader proposes a new block.
2. Soft Vote: A committee of voters assesses the proposed block.
3. Certify Vote: Another committee certifies the block if it meets the required honesty threshold.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Quantoz USDQ is present on the following networks: Algorand, Ethereum, Polygon.

Algorand's consensus mechanism, Pure Proof-of-Stake (PPoS), relies on the participation of token holders (stakers) to ensure the network's security and integrity:

1. Participation Rewards:
   - Staking Rewards: Users who participate in the consensus protocol by staking their ALGO tokens earn rewards. These rewards are distributed periodically and are proportional to the amount of ALGO staked. This incentivizes users to hold and stake their tokens, contributing to network security and stability.
   - Node Participation Rewards: Validators, also known as participation nodes, are responsible for proposing and voting on blocks. These nodes receive additional rewards for their active role in maintaining the network.

2. Transaction Fees:
   - Flat Fee Model: Algorand employs a flat fee model for transactions, which ensures predictability and simplicity. The standard transaction fee on Algorand is very low (around 0.001 ALGO per transaction). These fees are paid by users to have their transactions processed and included in a block.
   - Fee Redistribution: Collected transaction fees are redistributed to participants in the network. This includes stakers and validators, further incentivizing their participation and ensuring continuous network operation.
3. Economic Security:
   Token Locking: To participate in the consensus mechanism, users must lock up their ALGO tokens. This economic stake acts as a security deposit that can be slashed (forfeited) if the participant acts maliciously. The potential loss of staked tokens discourages dishonest behavior and helps maintain network integrity.

Fees on the Algorand Blockchain

1. Transaction Fees:
   Algorand uses a flat transaction fee model. The current standard fee is 0.001 ALGO per transaction. This fee is minimal compared to other blockchain networks, ensuring affordability and accessibility.
2. Smart Contract Execution Fees:
   Fees for executing smart contracts on Algorand are also designed to be low. These fees are based on the computational resources required to execute the contract, ensuring that users are only charged for the actual resources they consume.
3. Asset Creation Fees:
   Creating new assets (tokens) on the Algorand blockchain involves a small fee. This fee is necessary to prevent spam and ensure that only genuine assets are created and maintained on the network.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.

- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) algorand, ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Echelon Prime

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Echelon Prime	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	171.46644	kWh/a

Qualitative information

S.4 Consensus Mechanism

Echelon Prime is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Echelon Prime is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many

L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

spacecoin 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	spacecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/

Field	Value	Unit
S.8 Energy consumption	170.72822	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

WINkLink

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	WINkLink	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	170.27745	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make

assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Orderly Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Orderly Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	167.89103	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

midnight

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	midnight	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	167.62155	kWh/a

Qualitative information

S.4 Consensus Mechanism

midnight is present on the following networks: Binance Smart Chain, Cardano.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Core Components: Cardano uses the Ouroboros consensus mechanism, a Proof of Stake (PoS) protocol designed for scalability, security, and energy efficiency.

Core Concepts:

1. Proof of Stake (PoS): Validators (called slot leaders) are selected based on the amount of ADA they have staked, rather than solving complex computational puzzles. Validators propose and validate blocks, which are added to the blockchain.
2. Epochs and Slot Leaders: Cardano divides time into epochs (fixed time periods), each of which is subdivided into slots. Slot leaders are selected for each slot to validate and propose blocks. Slot leaders are chosen randomly based on the amount of ADA staked. More stake increases the probability of being selected. Validators are responsible for confirming transactions during their slot and passing the block to the next slot leader.
3. Delegation and Staking Pools: ADA holders can delegate their tokens to staking pools, which increases the pool’s chances of being selected to validate a block. The pool operator and delegators share the rewards based on their stakes. This system ensures that participants who do not want to operate a full validator node can still earn rewards and contribute to network security by supporting trusted staking pools.
4. Security and Adversary Resistance: Ouroboros ensures security even in the presence of potential attacks. It assumes that adversaries may attempt to propagate alternative chains or send arbitrary messages. The protocol is secure as long as more than 51% of the staked ADA is

controlled by honest participants. Settlement Delay: To protect against adversarial attacks, the new slot leader must consider the last few blocks as transient. Only the blocks preceding these are treated as finalized, ensuring that chain finality is secure against manipulation attempts. This mechanism also allows participants to temporarily go offline and resynchronize as long as they are not disconnected for more than the settlement delay period.

5. Chain Selection: Cardano's nodes adopt the longest valid chain rule: each node stores a local copy of the blockchain and replaces it with any discovered valid, longer chain. This ensures that all nodes eventually converge on a single version of the blockchain, maintaining network consistency.

S.5 Incentive Mechanisms and Applicable Fees

midnight is present on the following networks: Binance Smart Chain, Cardano.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Cardano uses incentive mechanisms to ensure network security and decentralization through staking rewards, slashing mechanisms, and transaction fees.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   - Validators, known as slot leaders, secure the network by validating transactions and creating new blocks. To participate, validators must stake ADA, and those with larger stakes are more likely to be selected as slot leaders.
   - Validators are rewarded with newly minted ADA and transaction fees for successfully producing blocks and validating transactions.
   - Delegators, who may not wish to run a validator node, can delegate their ADA to staking pools. By doing so, they contribute to the network's security and earn a share of the rewards earned by the pool. The rewards are distributed proportionally based on the amount of ADA delegated.
2. Slashing Mechanism:
   - To prevent malicious behavior, Cardano employs a slashing mechanism. Validators who act dishonestly, fail to validate transactions properly, or produce incorrect blocks face penalties that involve the slashing of a portion of their staked ADA.
   - This provides strong economic incentives for validators to act honestly and ensures the network's integrity and security.
3. Delegation and Pool Operation:
   - Staking pools can charge operation fees (a margin on rewards) to maintain their infrastructure. This includes fixed costs set by pool operators. Delegators earn rewards after pool fees are deducted, providing a balanced incentive for both operators and delegators to participate actively.
   - Rewards are distributed at the end of each epoch, where staking pool performance and participation determine the distribution of ADA rewards to all stakeholders.

Applicable Fees:

1. Transaction Fees:
   - Transaction fees on Cardano are paid in ADA and are generally low. They are calculated based on the size of the transaction and the network's current demand. These fees are paid to validators for including transactions in new blocks.
   - The fee formula is: a + b × size, where a is a constant (typically 0.155381 ADA), b is a coefficient related to the transaction size (0.000043946 ADA/byte), and size refers to the transaction size in bytes. This ensures that the fee adapts based on network load and the size of each transaction.

2. Staking Pool Fees:
   - Staking pool operators charge operational costs and a margin fee, which covers the cost of running and maintaining the staking pool. These fees vary between pools but ensure that operators can continue to provide their services while offering rewards to delegators.
   - After the operator's fee, the remaining rewards are distributed among the delegators based on the size of their stake.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, cardano is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Centrifuge

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Centrifuge	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	167.18173	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

KERNEL

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	KERNEL	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/

Field	Value	Unit
S.8 Energy consumption	165.19569	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Aerodrome

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Aerodrome	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	164.81458	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset

within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

gomining

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	gomining	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	164.51307	kWh/a

Qualitative information

S.4 Consensus Mechanism

gomining is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

gomining is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ecomi

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ecomi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	163.86581	kWh/a

Qualitative information

S.4 Consensus Mechanism

ecomi is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

ecomi is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

UMA Voting Token v1

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	UMA Voting Token v1	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	163.28058	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

bondex

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	bondex	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	158.38804	kWh/a

Qualitative information

S.4 Consensus Mechanism

bondex is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

bondex is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Mask Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Mask Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	156.71844	kWh/a

Qualitative information

S.4 Consensus Mechanism

Mask Network is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here’s a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Mask Network is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees

associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Bluzelle Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bluzelle Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	155.62367	kWh/a

Qualitative information

S.4 Consensus Mechanism

Bluzelle Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an

entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Bluzelle Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Zebec Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Zebec Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	154.03360	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Aevo

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Aevo	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	153.06668	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Wootrade Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Wootrade Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	152.25595	kWh/a

Qualitative information

S.4 Consensus Mechanism

Wootrade Network is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Near Protocol, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here’s a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Wootrade Network is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Near Protocol, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.
3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.
2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.

- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, near_protocol, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

balance

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	balance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	152.02899	kWh/a

Qualitative information

S.4 Consensus Mechanism

balance is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.

6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

balance is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best

effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

API3

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	API3	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	148.45624	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Alchemy



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Alchemy	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	148.37494	kWh/a

Qualitative information

S.4 Consensus Mechanism

Alchemy is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Alchemy is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

swell

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	swell	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	146.54113	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon

Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

htx

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	htx	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	143.30831	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Enjin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Enjin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/

Field	Value	Unit
S.8 Energy consumption	142.42720	kWh/a

Qualitative information

S.4 Consensus Mechanism

Enjin is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Enjin is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more

tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Blur

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Blur	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	142.21441	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Civic

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Civic	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	140.60738	kWh/a

Qualitative information

S.4 Consensus Mechanism

Civic is present on the following networks: Ethereum, Tron.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

Civic is present on the following networks: Ethereum, Tron.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Ocean Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ocean Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	140.29930	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Alchemix

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Alchemix	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	139.59000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Succinct

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Succinct	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	137.81676	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon

Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Threshold Network Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Threshold Network Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	137.39118	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Pstake Finance 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Pstake Finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	137.36050	kWh/a

Qualitative information

S.4 Consensus Mechanism

Pstake Finance is present on the following networks: Base, Binance Smart Chain, Ethereum, Optimism, Osmosis, Sui.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.

- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.

2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5.Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Pstake Finance is present on the following networks: Base, Binance Smart Chain, Ethereum, Optimism, Osmosis, Sui.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.

- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum, optimism, osmosis, sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

APENFT

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	APENFT	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	135.17435	kWh/a

Qualitative information

S.4 Consensus Mechanism

APENFT is present on the following networks: Binance Smart Chain, Ethereum, Huobi, Tron.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives

7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Key Features of HECO's Consensus Mechanism:

1. Validator Selection: HECO supports up to 21 validators, selected based on their stake in the network.
2. Transaction Processing: Validators are responsible for processing transactions and adding blocks to the blockchain.
3. Transaction Finality: The consensus mechanism ensures quick finality, allowing for rapid confirmation of transactions.
4. Energy Efficiency: By utilizing PoS elements, HECO reduces energy consumption compared to traditional Proof-of-Work systems.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.

3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

APENFT is present on the following networks: Binance Smart Chain, Ethereum, Huobi, Tron.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Incentive Mechanism:

1. Validator Rewards:
   Validators are selected based on their stake in the network. They process transactions and add blocks to the blockchain. Validators receive rewards in the form of transaction fees for their role in maintaining the blockchain's integrity.
2. Staking Participation:
   Users can stake Huobi Token (HT) to become validators or delegate their tokens to existing validators. Staking helps secure the network and, in return, participants receive a portion of the transaction fees as rewards.

Applicable Fees:

1. Transaction Fees (Gas Fees):
   Users pay gas fees in HT tokens to execute transactions and interact with smart contracts on the HECO network. These fees compensate validators for processing and validating transactions.
2. Smart Contract Execution Fees:
   Deploying and interacting with smart contracts incur additional fees, which are also paid in HT tokens. These fees cover the computational resources required to execute contract code.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, huobi, tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely

economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

StorjToken

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	StorjToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	129.80168	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

BENQI 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	BENQI	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	126.84577	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.

- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

S.5 Incentive Mechanisms and Applicable Fees

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network’s inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

OriginToken

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	OriginToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	125.61682	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ket

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ket	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	124.29738	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

S.5 Incentive Mechanisms and Applicable Fees

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network’s inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Big Time

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Big Time	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	123.70171	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

AIOZ Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	AIOZ Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	123.13427	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Hyperlane

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Hyperlane	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	121.82698	kWh/a

Qualitative information

S.4 Consensus Mechanism

Hyperlane is present on the following networks: Arbitrum, Base, Binance Smart Chain, Ethereum, Optimism.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus

mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon

Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

Hyperlane is present on the following networks: Arbitrum, Base, Binance Smart Chain, Ethereum, Optimism.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be

withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, binance_smart_chain, ethereum, optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

LoopringCoin V2

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	LoopringCoin V2	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	121.43195	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the

heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

cat in a dogs world



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	cat in a dogs world	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	119.74866	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

quack_ai

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	quack_ai	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	114.00742	kWh/a

Qualitative information

S.4 Consensus Mechanism

quack_ai is present on the following networks: Binance Smart Chain, Ethereum.

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This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

quack_ai is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Verse World

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Verse World	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	111.13126	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

HoloToken

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	HoloToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	110.91058	kWh/a

Qualitative information

S.4 Consensus Mechanism

HoloToken is present on the following networks: Ethereum, Gnosis Chain.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

S.5 Incentive Mechanisms and Applicable Fees

HoloToken is present on the following networks: Ethereum, Gnosis Chain.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain’s incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders’ economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, gnosis_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Gluwa Creditcoin Vesting Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Gluwa Creditcoin Vesting Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	110.15410	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Wormhole Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Wormhole Token	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	109.72845	kWh/a

Qualitative information

S.4 Consensus Mechanism

Wormhole Token is present on the following networks: Arbitrum, Ethereum, Optimism, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides

a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Wormhole Token is present on the following networks: Arbitrum, Ethereum, Optimism, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more

tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, optimism, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

chintai

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	chintai	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	108.88930	kWh/a

Qualitative information

S.4 Consensus Mechanism

chintai is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.

6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

chintai is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used

and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Renzo

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Renzo	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	108.73551	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Zircuit

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Zircuit	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	105.96924	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Covalent X Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Covalent X Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	102.49368	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Request Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Request Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	102.35182	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

dogwifhat 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	dogwifhat	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	102.16455	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Cartesi Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Cartesi Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	101.78438	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

bluwhale

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	bluwhale	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	97.76196	kWh/a

Qualitative information

S.4 Consensus Mechanism

bluwhale is present on the following networks: Binance Smart Chain, Sui.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.

4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5.Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

bluwhale is present on the following networks: Binance Smart Chain, Sui.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

rhea_finance



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	rhea_finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	97.54880	kWh/a

Qualitative information

S.4 Consensus Mechanism

rhea_finance is present on the following networks: Binance Smart Chain, Near Protocol.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives

7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
   - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
   - Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
   - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
   - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
   - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
   - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
   - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

S.5 Incentive Mechanisms and Applicable Fees

rhea_finance is present on the following networks: Binance Smart Chain, Near Protocol.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
   Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.
2. Delegation:
   Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.
3. Slashing and Economic Penalties:
   Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.
4. Epoch Rotation and Validator Selection:
   Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:
   Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.
2. Storage Fees:
   NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.
3. Redistribution and Burning:
   A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.
4. Reserve Requirement:
   Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, near_protocol is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational.

As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Kyber Network Crystal v2

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Kyber Network Crystal v2	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	97.14927	kWh/a

Qualitative information

S.4 Consensus Mechanism

Kyber Network Crystal v2 is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Optimism, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Kyber Network Crystal v2 is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Optimism, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they

have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:
- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:
- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:
Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:
State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum, optimism, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information

regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Vanar

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Vanar	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	96.62545	kWh/a

Qualitative information

S.4 Consensus Mechanism

Vanar is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Vanar is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees

associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Hashflow

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Hashflow	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	95.47162	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks,

but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Wen



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Wen	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	94.40203	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

eclipse

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	eclipse	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	94.15334	kWh/a

Qualitative information

S.4 Consensus Mechanism

eclipse is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.

- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

eclipse is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

bitlayer

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	bitlayer	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	93.98209	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Phala

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Phala	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	93.34372	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SuperRare

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SuperRare	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	92.06698	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Orca



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Orca	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	91.96856	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Mind Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Mind Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	90.84697	kWh/a

Qualitative information

S.4 Consensus Mechanism

Mind Network is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA).

This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Mind Network is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Gnosis Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Gnosis Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	90.51261	kWh/a

Qualitative information

S.4 Consensus Mechanism

Gnosis Token is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Gnosis Token is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.

- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:
- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:
- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using

empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

GMX

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	GMX	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	88.51075	kWh/a

Qualitative information

S.4 Consensus Mechanism

GMX is present on the following networks: Arbitrum, Avalanche.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

S.5 Incentive Mechanisms and Applicable Fees

GMX is present on the following networks: Arbitrum, Avalanche.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.

- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network’s inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the

financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Biconomy Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Biconomy Token	/
	2025-02-03	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	86.25073	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

anoma

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	anoma	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	86.10468	kWh/a

Qualitative information

S.4 Consensus Mechanism

anoma is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

anoma is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy

consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Rarible

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Rarible	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	82.63331	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Harvest Finance

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Harvest Finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	81.66011	kWh/a

Qualitative information

S.4 Consensus Mechanism

Harvest Finance is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here’s a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Harvest Finance is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC

tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

codatta

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	codatta	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	75.83407	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

saros

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	saros	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	75.75996	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators.

This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

POPCAT 

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	POPCAT	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	74.79977	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

propy

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	propy	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	74.25072	kWh/a

Qualitative information

S.4 Consensus Mechanism

propy is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

propy is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

obol

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	obol	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	73.69615	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks,

but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Aavegotchi GHST Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Aavegotchi GHST Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	71.59367	kWh/a

Qualitative information

S.4 Consensus Mechanism

Aavegotchi GHST Token is present on the following networks: Base, Ethereum, Polygon.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.

- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Aavegotchi GHST Token is present on the following networks: Base, Ethereum, Polygon.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Adventure Gold



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Adventure Gold	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	71.56825	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

PolkastarterToken

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	PolkastarterToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	71.07174	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Pyth Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Pyth Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	69.22503	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Gitcoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Gitcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	68.58919	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Enzyme 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Enzyme	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	68.57231	kWh/a

Qualitative information

S.4 Consensus Mechanism

Enzyme is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Enzyme is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

overtake

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	overtake	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	67.11839	kWh/a

Qualitative information

S.4 Consensus Mechanism

overtake is present on the following networks: Binance Smart Chain, Sui.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.
3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.

4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5.Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

overtake is present on the following networks: Binance Smart Chain, Sui.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Ambire AdEx



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ambire AdEx	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	66.26197	kWh/a

Qualitative information

S.4 Consensus Mechanism

Ambire AdEx is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Ambire AdEx is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be

withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

theoriq

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	theoriq	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	65.89392	kWh/a

Qualitative information

S.4 Consensus Mechanism

theoriq is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

theoriq is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

BandToken

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	BandToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	65.76420	kWh/a

Qualitative information

S.4 Consensus Mechanism

BandToken is present on the following networks: Binance Smart Chain, Ethereum, Fantom.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an

entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

S.5 Incentive Mechanisms and Applicable Fees

BandToken is present on the following networks: Binance Smart Chain, Ethereum, Fantom.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom’s incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom’s staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, fantom is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

GameBuild

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	GameBuild	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	64.68479	kWh/a

Qualitative information

S.4 Consensus Mechanism

GameBuild is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

GameBuild is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

deBridge

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	deBridge	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	64.00713	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

vultisig 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	vultisig	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	63.26945	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

puffer

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	puffer	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	62.98573	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Goldfinch 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Goldfinch	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	62.98573	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ROOK

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ROOK	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	62.27643	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

GAIB

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	GAIB	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	62.14772	kWh/a

Qualitative information

S.4 Consensus Mechanism

GAIB is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

GAIB is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Orchid

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Orchid	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	61.35435	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

pipe_network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	pipe_network	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	60.61181	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

aixbt by Virtuals 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	aixbt by Virtuals	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	60.22098	kWh/a

Qualitative information

S.4 Consensus Mechanism

aixbt by Virtuals is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

aixbt by Virtuals is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

iEx ec Network Token



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	iEx ec Network Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	60.00668	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Marlin POND

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Marlin POND	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	59.59953	kWh/a

Qualitative information

S.4 Consensus Mechanism

Marlin POND is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Marlin POND is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.

- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the

energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

talus

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	talus	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	59.20884	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:
   - The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
   - Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
   - Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.
2. Transaction Validation:
   Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.

3. Optimistic Execution:
   Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.
4. Finality and Latency:
   The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.
5.Fault Tolerance:
   The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:
   Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.
2. Slashing:
   Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.
3. Delegation:
   Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:
   Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.
2. Dynamic Fee Model:
   The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

AI Rig Complex

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	AI Rig Complex	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	56.00561	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

lava_network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	lava_network	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	54.82324	kWh/a

Qualitative information

S.4 Consensus Mechanism

lava_network is present on the following networks: Arbitrum, Base, Binance Smart Chain, Osmosis.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

lava_network is present on the following networks: Arbitrum, Base, Binance Smart Chain, Osmosis.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, binance_smart_chain, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Open Campus

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Open Campus	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	54.01183	kWh/a

Qualitative information

S.4 Consensus Mechanism

Open Campus is present on the following networks: Binance Smart Chain, Edu Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators

and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.

9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Open Campus is present on the following networks: Binance Smart Chain, Edu Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

xl_one

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	xl_one	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	52.34625	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Jito

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Jito	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	51.73451	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Keep3rV1



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Keep3rV1	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	51.28230	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

CelerToken C

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	CelerToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	51.01647	kWh/a

Qualitative information

S.4 Consensus Mechanism

CelerToken is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

CelerToken is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

playsout

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	playsout	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/

Field	Value	Unit
S.8 Energy consumption	50.96633	kWh/a

Qualitative information

S.4 Consensus Mechanism

playsout is present on the following networks: Base, Binance Smart Chain.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.

8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

playsout is present on the following networks: Base, Binance Smart Chain.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

almanak

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	almanak	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/

Field	Value	Unit
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	50.91811	kWh/a

Qualitative information

S.4 Consensus Mechanism

almanak is present on the following networks: Arbitrum, Base, Binance Smart Chain, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an

entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

almanak is present on the following networks: Arbitrum, Base, Binance Smart Chain, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be

withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

dYdX

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	dYdX	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	50.67098	kWh/a

Qualitative information

S.4 Consensus Mechanism

dYdX is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

dYdX is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators.

This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

derive 

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	derive	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	50.41144	kWh/a

Qualitative information

S.4 Consensus Mechanism

derive is present on the following networks: Arbitrum, Base, Ethereum, Optimism.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
   - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
   - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
   - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
   - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
   - Assumption of Validity: Transactions are assumed to be valid by default.
   - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
   - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
   - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
   - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

derive is present on the following networks: Arbitrum, Base, Ethereum, Optimism.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
   - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
   - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
   - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
   - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
   - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
   - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
   - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
   - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
   - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, ethereum, optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Badger

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Badger	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	50.36021	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator

is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ResearchCoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ResearchCoin	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	48.30630	kWh/a

Qualitative information

S.4 Consensus Mechanism

ResearchCoin is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

ResearchCoin is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

cudis



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	cudis	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	47.78811	kWh/a

Qualitative information

S.4 Consensus Mechanism

cudis is present on the following networks: Binance Smart Chain, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides

a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

cudis is present on the following networks: Binance Smart Chain, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number

of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

My Shell

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	My Shell	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	46.94808	kWh/a

Qualitative information

S.4 Consensus Mechanism

My Shell is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

My Shell is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy

consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

PORTAL

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	PORTAL	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	46.53000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

sport_fun

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	sport_fun	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	45.80226	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Across Protocol Token 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Across Protocol Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	45.67884	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

infinity_ground 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	infinity_ground	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	44.79822	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously.

Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.

8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

gaia

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	gaia	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	44.40210	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

camp

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	camp	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/

Field	Value	Unit
S.8 Energy consumption	43.90560	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

TrueFi

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	TrueFi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	43.48002	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Dent

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Dent	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	42.55793	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Bricks 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bricks	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	42.04800	kWh/a

Qualitative information

S.4 Consensus Mechanism

Arbitrum Nova is a Layer 2 blockchain built using Arbitrum's AnyTrust technology. It relies on a data availability committee to sign off on blocks, rather than posting all data to Ethereum, enabling lower fees while inheriting Ethereum’s base layer security for final settlement.

S.5 Incentive Mechanisms and Applicable Fees

Transaction fees on Arbitrum Nova are paid in ETH and kept minimal due to reduced data costs. There is no native token; incentives and security assumptions depend on the integrity of the committee and Ethereum as the settlement layer.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum_arbitrum_nova is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

anon

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	anon	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	41.69964	kWh/a

Qualitative information

S.4 Consensus Mechanism

anon is present on the following networks: Arbitrum, Base, Binance Smart Chain, Ethereum, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

anon is present on the following networks: Arbitrum, Base, Binance Smart Chain, Ethereum, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

myx_finance

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	myx_finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	41.18628	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of

being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SUNDOG 

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SUNDOG	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	40.40598	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make

assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Venice Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Venice Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	40.22458	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Flux

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Flux	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	40.10265	kWh/a

Qualitative information

S.4 Consensus Mechanism

Flux is present on the following networks: Binance Smart Chain, Ethereum, Solana, Tron.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs)who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction feesfor their work.

S.5 Incentive Mechanisms and Applicable Fees

Flux is present on the following networks: Binance Smart Chain, Ethereum, Solana, Tron.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
   - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
   - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
   - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
   - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
   - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.
3. Incentive for SRs:
   SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:
   - Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
   - Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
2. Storage Fees:
   Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
3. Energy and Bandwidth:
   Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana, tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Neiro

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Neiro	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	40.07538	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

BarnBridge



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	BarnBridge	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	39.72073	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Ampleforth Governance

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ampleforth Governance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	39.43701	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

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To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

astra_nova

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	astra_nova	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	39.40251	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Liquid Staked ETHereum

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Liquid Staked ETHereum	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	39.09669	kWh/a

Qualitative information

S.4 Consensus Mechanism

Liquid Staked ETHereum is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Liquid Staked ETHereum is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result

is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

AVA 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	AVA	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	38.71605	kWh/a

Qualitative information

S.4 Consensus Mechanism

AVA is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators

and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.

9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

AVA is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

GIGACHAD 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	GIGACHAD	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	37.53735	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Tokemak

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Tokemak	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	37.30912	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Coin98

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Coin98	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	37.15806	kWh/a

Qualitative information

S.4 Consensus Mechanism

Coin98 is present on the following networks: Avalanche, Binance Smart Chain, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA).

This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Coin98 is present on the following networks: Avalanche, Binance Smart Chain, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used

and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

NYM

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	NYM	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	36.74168	kWh/a

Qualitative information

S.4 Consensus Mechanism

NYM is present on the following networks: Ethereum, Osmosis.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.

- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

NYM is present on the following networks: Ethereum, Osmosis.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Clover

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Clover	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	34.47192	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Huma Finance



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Huma Finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	34.32130	kWh/a

Qualitative information

S.4 Consensus Mechanism

Huma Finance is present on the following networks: Binance Smart Chain, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Huma Finance is present on the following networks: Binance Smart Chain, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Augur Reputation Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Augur Reputation Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	33.97541	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Chromia

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Chromia	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	33.33704	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Serum

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Serum	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	33.07007	kWh/a

Qualitative information

S.4 Consensus Mechanism

Serum is present on the following networks: Binance Smart Chain, Ethereum, Solana, Terra Classic.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA).

This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.

- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

Terra blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, which ensures fast, scalable, and secure transaction processing.

Core Components:

- Delegated Proof of Stake (DPoS):
  - Validators: A limited set of validators are responsible for validating transactions, proposing blocks, and securing the network. Validators are selected based on the amount of LUNA tokens staked, either directly or delegated by token holders.
  - Delegation: LUNA holders can delegate their tokens to validators, allowing them to participate in staking rewards without running their own validator nodes.
  - Rotational Leadership: Validators are selected in a round-robin manner to propose new blocks, ensuring fairness and efficiency in block production.
- Tendermint BFT (Byzantine Fault Tolerance):
  - Terra integrates the Tendermint Core consensus engine, providing fast block finality and resilience against up to one-third of malicious or faulty validators.
  - Finality: Transactions are confirmed once a block is added, reducing the risk of chain reorganizations and ensuring immediate finality.
  - Governance Integration: LUNA token holders participate in governance by voting on proposals related to protocol upgrades, parameter changes, and community decisions, aligning stakeholder incentives with network health.

S.5 Incentive Mechanisms and Applicable Fees

Serum is present on the following networks: Binance Smart Chain, Ethereum, Solana, Terra Classic.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more

tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:
Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:
Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

The Terra blockchain's incentive structure is designed to reward network participants, ensure security, and sustain ecosystem growth, while its fee model aligns with its focus on scalability and cost-efficiency.

Incentive Mechanisms:

- Validators: Validators earn staking rewards for their role in securing the network and validating transactions. Rewards are distributed in LUNA tokens, derived from transaction fees and seigniorage revenue.
- Delegators: LUNA holders who delegate their tokens to validators receive a share of staking rewards, proportional to the amount delegated, incentivizing broad participation.
- Seigniorage Rewards: Validators and delegators benefit from seigniorage revenue, generated when new stablecoins (e.g., TerraUSD) are minted. A portion of this revenue is allocated to reward LUNA stakers.
- Stability Incentives: LUNA token holders are incentivized to stake and participate in governance to maintain the stability of Terra’s ecosystem and its algorithmic stablecoins.

- Governance Participation Rewards: Validators and delegators have governance voting rights, enabling them to shape the network's future. Participation in governance aligns incentives with long-term ecosystem health.

Applicable Fees:

- Transaction Fees: Users pay fees in LUNA or stablecoins for transactions such as fund transfers, smart contract execution, and staking. These fees are distributed among validators and delegators, providing additional incentives for network security and functionality.
- Dynamic Fee Model: Transaction fees are dynamically adjusted based on network congestion and transaction size. This ensures efficient resource allocation while keeping fees affordable for users.
- Seigniorage Fee: A portion of revenue from stablecoin minting is directed to the treasury and distributed to stakers, reinforcing network participation and development.
- Burning Mechanism: A portion of fees and seigniorage revenue may be burned, reducing LUNA supply over time and contributing to its deflationary tokenomics.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana, terra_classic is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Zeus Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Zeus Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	33.05065	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

rayls

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	rayls	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	31.61764	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

openloot

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	openloot	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	31.27438	kWh/a

Qualitative information

S.4 Consensus Mechanism

openloot is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

openloot is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy

consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Alchemist AI

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Alchemist AI	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	30.23111	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Magic Eden

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Magic Eden	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	29.80409	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Samoyedcoin 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Samoyedcoin	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	29.68709	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Sonic SVM

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Sonic SVM	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	29.60520	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Vine Coin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Vine Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	28.14278	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Drift 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Drift	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	26.66866	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the

network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Open Loot



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Open Loot	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	26.10220	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Banana For Scale 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Banana For Scale	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	25.77711	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of

being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

StaFi

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	StaFi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	25.74755	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all

implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

bertram_the 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	bertram_the	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	25.67589	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Gmt

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Gmt	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	24.59203	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Soso Value

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Soso Value	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	24.26682	kWh/a

Qualitative information

S.4 Consensus Mechanism

Soso Value is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Soso Value is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

FWOG 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	FWOG	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	24.17085	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Sweat Economy

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Sweat Economy	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	24.11616	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Star Atlas Dao

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Star Atlas Dao	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	24.04968	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

StablR Euro

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	StablR Euro	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	23.61965	kWh/a

Qualitative information

S.4 Consensus Mechanism

StablR Euro is present on the following networks: Concordium, Ethereum, Solana.

Concordium is a public and permissionless blockchain that employs a Layered Proof-of-Stake (PoS) consensus mechanism combined with a Byzantine Fault Tolerance (BFT) protocol for enhanced security and finality.

Core Components:

1. Layered PoS Structure:
   - Proof-of-Stake for Block Production: Concordium uses PoS where users, known as validators, stake their tokens to participate in block creation and validation. Each validator's chances of being selected as the block producer (leader) depend on their staked amount, promoting fair participation.
   - Two-Layer Structure: Concordium separates block production and finalization into two distinct layers to increase security and reduce forks:
     - Block Production Layer: Responsible for creating new blocks and proposing them to the network.
     - Finalization Layer: Ensures blocks are finalized using a BFT protocol, making them irreversible once confirmed.
2. Finalization Layer (BFT Protocol):
   - Byzantine Fault Tolerance: The finalization layer uses a BFT protocol to validate and finalize blocks, ensuring they cannot be altered once added. This layer provides extra security by minimizing the potential for forks, as finalized blocks are definitive.
   - Finalization Committee: A subset of bakers (validators) is chosen as the finalization committee, whose members, known as finalizers, handle the finalization of blocks. This guarantees that confirmed blocks achieve consensus and permanence.
3. Identity-Based Anonymity:
   - Identity Verification: Concordium introduces an identity layer that verifies participant identities while maintaining user anonymity. This approach balances regulatory compliance and privacy, ensuring participants are pseudonymous but verifiable.
   - Sybil Attack Resistance: The combination of PoS and identity verification reduces the risk of Sybil attacks, as participants must have verified identities to contribute to consensus.
4. Leader Selection and Epochs:
   - Leader Selection: In each epoch, a specific baker (validator) is chosen as the leader, responsible for producing blocks. Leader selection uses a random nonce to ensure fairness and unpredictability.
   - Epochs: Each epoch lasts one hour, with fixed bakers for the duration. Leader selection within the epoch is based on each baker's relative stake, providing proportional chances for leader selection.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

StablR Euro is present on the following networks: Concordium, Ethereum, Solana.

Concordium incentivizes network security, participation, and governance through staking rewards, transaction fees, and a dynamic minting model.

Incentive Mechanisms:

1. Validator Rewards:
   - Transaction Fees and Staking Rewards: Validators who contribute to block creation and verification receive transaction fees and staking rewards. This incentivizes validators to uphold network security and stability.
   - Baker and Finalizer Rewards: Concordium distributes rewards between bakers (validators creating blocks) and finalizers (validators finalizing blocks). Bakers receive the majority of rewards for their role in block production.
2. Staking Rewards:
   - Proportional Rewards: Validators earn rewards based on the size of their stake, encouraging users to participate in staking and network activities. The more CCD tokens staked, the higher the staking reward.
   - Governance Participation: By staking, users gain influence in network governance, including protocol upgrades and policy changes. This mechanism aligns validators' interests with the platform's long-term goals.
3. Minting Process and Distribution:
   - Daily Minting of CCD Tokens: Concordium mints new CCD tokens daily. This minting rate is governed by preset parameters to control the supply of CCD and ensure a sustainable ecosystem.
   - Distribution Model: 10% of newly minted CCD is allocated to the Concordium Foundation as a Platform Development Charge to support development.
   - 90% is divided as follows: Baker Rewards: 85% of the 90% is allocated to bakers for their role in block production. Finalizer Rewards: 5% of the 90% is allocated to finalizers, incentivizing their contribution to securing block finality.

Applicable Fees:

- Transaction fees on Concordium vary based on network demand and capacity, adjusting dynamically to ensure sustainable operations.
- Revenue for Validators: Collected fees are used to compensate validators, motivating them to process transactions accurately and efficiently.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) concordium, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

OMGToken

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	OMGToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	23.61965	kWh/a

Qualitative information

S.4 Consensus Mechanism

OMGToken is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

OMGToken is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.

- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

roll

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	roll	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	23.44456	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ai16z 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ai16z	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	23.41624	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Grass

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Grass	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	22.67918	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Cloud

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Cloud	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	22.57974	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

suku 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	suku	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	22.16696	kWh/a

Qualitative information

S.4 Consensus Mechanism

suku is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here’s a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

suku is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees

associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

swarms

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	swarms	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	21.07637	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides

a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
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   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the

network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

hivemapper

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	hivemapper	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	20.95938	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators.

This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

IDEX Token



Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	IDEX Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	20.92431	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all

implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

AlphaToken

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	AlphaToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	20.41637	kWh/a

Qualitative information

S.4 Consensus Mechanism

AlphaToken is present on the following networks: Avalanche, Binance Smart Chain, Ethereum.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
   - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

AlphaToken is present on the following networks: Avalanche, Binance Smart Chain, Ethereum.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network’s inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.
3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Alien Worlds Trilium

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Alien Worlds Trilium	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	20.21878	kWh/a

Qualitative information

S.4 Consensus Mechanism

Alien Worlds Trilium is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.

8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Alien Worlds Trilium is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SOON

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SOON	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	19.94607	kWh/a

Qualitative information

S.4 Consensus Mechanism

SOON is present on the following networks: Base, Binance Smart Chain, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

SOON is present on the following networks: Base, Binance Smart Chain, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

tribe

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	tribe	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	19.86037	kWh/a

Qualitative information

S.4 Consensus Mechanism

tribe is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

tribe is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

tokenbot

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	tokenbot	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	19.84225	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many

L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Melania Meme 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Melania Meme	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	19.71089	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Marinade

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Marinade	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	19.65908	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the

network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

elixir

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	elixir	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	19.08014	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Keep Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Keep Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	18.72549	kWh/a

Qualitative information

S.4 Consensus Mechanism

Keep Network is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.

- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Keep Network is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

zerebro 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	zerebro	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	18.60781	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

BitDAO

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	BitDAO	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	17.94526	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

bless

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	bless	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/

Field	Value	Unit
S.8 Energy consumption	17.91305	kWh/a

Qualitative information

S.4 Consensus Mechanism

bless is present on the following networks: Binance Smart Chain, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.

9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

bless is present on the following networks: Binance Smart Chain, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Parcl

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Parcl	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	16.95820	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.

- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of

the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Moo Deng 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Moo Deng	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	16.50193	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Multichain

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Multichain	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	16.43533	kWh/a

Qualitative information

S.4 Consensus Mechanism

Multichain is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Fantom, Moonriver, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA).

This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
   - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
   - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
   - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
   - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Moonriver operates on a Proof of Stake (PoS) consensus mechanism, enhanced by Polkadot's Nominated Proof of Stake (NPoS) model. This structure ensures secure, scalable, and decentralized transaction processing, leveraging the robust Substrate framework.

Core Components:

- Nominated Proof of Stake (NPoS):
  Validators are selected through staking by token holders, known as nominators, who delegate their MOVR tokens to trusted validator nodes. Validators with higher stakes and nominations are chosen to validate blocks and secure the network.
- Collator Nodes:
  Moonriver employs collator nodes, responsible for aggregating transactions into blocks and submitting them to the Polkadot Relay Chain for final validation. Collators ensure fast block production while relying on Polkadot's shared security.
- Byzantine Fault Tolerance (BFT):
  Moonriver integrates BFT properties to handle network disruptions and maintain consensus even if some validators act maliciously or become unavailable.
- Seamless Interoperability:
  As a parachain within the Polkadot ecosystem, Moonriver benefits from Polkadot's cross-chain messaging protocols, enabling secure and efficient interoperability with other parachains and external blockchains.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Multichain is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Fantom, Moonriver, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   - Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
   - Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.
2. Delegation for Token Holders:
   Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Moonriver's incentive model ensures active participation from validators, nominators, and developers while maintaining network security and usability.

Incentive Mechanisms:

- Staking Rewards: Validators and nominators earn MOVR tokens for securing the network and validating transactions.
- Collator Rewards: Collators, who propose blocks, are rewarded with MOVR tokens.
- Inflationary Rewards: New MOVR tokens are minted to fund staking and ecosystem development.
- Developer Incentives: A portion of rewards supports dApp development and ecosystem growth.

Applicable Fees:

- Transaction Fees: Paid in MOVR for transfers and smart contract interactions, distributed to validators and collators.
- Gas Fees: Calculated based on transaction complexity, ensuring predictable costs.
- Fee Burning: A portion of fees is burned, reducing token supply over time to support value retention.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.

- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum, fantom, moonriver, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Robonomics

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Robonomics	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	16.17201	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Mirror Protocol

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Mirror Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	15.78582	kWh/a

Qualitative information

S.4 Consensus Mechanism

Mirror Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Mirror Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

giza



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	giza	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	15.67550	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

xMoney

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	xMoney	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	15.67550	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Act I The AI Prophecy 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Act I The AI Prophecy	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	15.57768	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Aventus

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Aventus	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	14.68249	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

mira 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	mira	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	14.06179	kWh/a

Qualitative information

S.4 Consensus Mechanism

mira is present on the following networks: Base, Binance Smart Chain.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

mira is present on the following networks: Base, Binance Smart Chain.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

bifrost



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	bifrost	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13.83133	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

rubic

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	rubic	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13.69980	kWh/a

Qualitative information

S.4 Consensus Mechanism

rubic is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.

5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

rubic is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Unifi Protocol

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/

Field	Value	Unit
S.3 Name of the crypto-asset	Unifi Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13.68133	kWh/a

Qualitative information

S.4 Consensus Mechanism

Unifi Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.

8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Unifi Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

boost

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	boost	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13.40575	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

aura 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	aura	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13.32973	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Unstable Coin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Unstable Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13.17681	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Dai Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Dai Token	/
	2025-02-03	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	13.06994	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.

9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

retardio

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	retardio	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	13.04477	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.

- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of

the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

zeta

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	zeta	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	12.74142	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Nobody Sausage

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Nobody Sausage	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	12.46064	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

test griffain com

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	test griffain com	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	12.44226	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Omni Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Omni Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	12.34180	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Litentry



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Litentry	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	12.12901	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Solayer

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Solayer	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	11.72860	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

PONKE

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	PONKE	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	11.55310	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Jupiter

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Jupiter	/
	2025-02-03	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	11.14334	kWh/a

Qualitative information

S.4 Consensus Mechanism

Jupiter is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators

and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.

9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Jupiter is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Stablr Usd

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Stablr Usd	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	11.06506	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

eurq

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	eurq	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	10.99413	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Swipe

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Swipe	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	10.87645	kWh/a

Qualitative information

S.4 Consensus Mechanism

Swipe is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Swipe is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Moonchain

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Moonchain	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	10.83684	kWh/a

Qualitative information

S.4 Consensus Mechanism

Moonchain is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Moonchain is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.

- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using

empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Eva AI

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Eva AI	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	10.78134	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

SelfKey

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	SelfKey	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	10.56855	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

planck

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	planck	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	10.48837	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the

energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Kin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Kin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	10.31130	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

spice

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	spice	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	9.78734	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

oxygen



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	oxygen	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	9.17492	kWh/a

Qualitative information

S.4 Consensus Mechanism

oxygen is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

oxygen is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number

of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Peanut the Squirrel 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Peanut the Squirrel	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	8.86810	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators.

This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Term Finance

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Term Finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	8.72438	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all

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yala_yu

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	yala_yu	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	8.60174	kWh/a

Qualitative information

S.4 Consensus Mechanism

yala_yu is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.

- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

yala_yu is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

michi 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	michi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	8.51462	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
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   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
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Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
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   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

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To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Avantis

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Avantis	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	8.45138	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many

L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Goatseus Maximus 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Goatseus Maximus	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	8.40598	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Cheems Token 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Cheems Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	7.98055	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of

being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Chill House 

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Chill House	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	7.95556	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

moonwalk_fitness

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	moonwalk_fitness	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	7.62380	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

carv

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	carv	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	7.41687	kWh/a

Qualitative information

S.4 Consensus Mechanism

carv is present on the following networks: Arbitrum, Base, Ethereum, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.

- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

carv is present on the following networks: Arbitrum, Base, Ethereum, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
   - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Tensor

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Tensor	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	7.40569	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

DOGS

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	DOGS	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	6.45054	kWh/a

Qualitative information

S.4 Consensus Mechanism

Toncoin utilizes a Proof of Stake (PoS) model with the Catchain consensus algorithm to provide a secure, scalable, and efficient multi-chain environment.

Core Components of Toncoin's Consensus:

1. Proof of Stake (PoS) with Validators:
   Validator Role: Validators are required to stake Toncoin to participate in consensus. They validate transactions and secure the network by processing blocks and maintaining network integrity.
2. Catchain Consensus Algorithm:
   - High Scalability and Speed: The Catchain consensus protocol is specifically designed for Toncoin's multi-chain architecture, optimizing for fast and scalable operations across multiple shards.
   - Multi-Chain Compatibility: Catchain supports a sharded environment, allowing different chains (or shards) to reach consensus efficiently. This approach enhances the network's ability to process a high volume of transactions in parallel.
3. Byzantine Fault Tolerance (BFT):
   Fault Tolerance: The Catchain protocol is Byzantine Fault Tolerant (BFT), meaning it can tolerate some level of malicious or faulty behavior among validators. This BFT compliance ensures that the network remains secure and functional even when a minority of validators act maliciously.
4. Validator Rotation and Slashing:
   - Regular Rotation: Validators are rotated regularly to enhance decentralization and security. This system prevents any single validator or group from maintaining control over consensus indefinitely.
   - Slashing for Malicious Behavior: Validators who act maliciously or fail to perform their duties may be penalized through slashing, losing a portion of their staked Toncoin. This discourages dishonest behavior and promotes reliable network participation.

S.5 Incentive Mechanisms and Applicable Fees

Toncoin incentivizes network security, participation, and efficiency through staking rewards, transaction fees, and slashing penalties.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   Rewards for Securing the Network: Validators earn staking rewards for actively participating in the network's consensus process and ensuring its security. These rewards are provided in Toncoin and are proportional to each validator's staked amount, encouraging validators to maintain their roles responsibly.
2. Transaction Fees:
   Ongoing Income for Validators: Validators also receive a share of transaction fees from the blocks they validate, providing a consistent reward that grows with network usage. This additional income incentivizes validators to process transactions accurately and efficiently.
3. Decentralization through Validator Rotation:
   Fair and Balanced Participation: The frequent rotation of validators ensures that new participants can join the validator set, promoting decentralization and preventing monopolization of the network by a small group of validators.
4. Slashing Mechanism:
   Penalties for Dishonest Behavior: To maintain security, Toncoin enforces a slashing mechanism that penalizes validators who act maliciously or fail to fulfill their duties. This risk of losing staked Toncoin encourages validators to behave honestly and fulfill their responsibilities.

Applicable Fees:

Transaction Fees: Transaction fees on the TON blockchain are paid in Toncoin. These fees vary based on transaction complexity and network demand, ensuring that validators are compensated for their work and that resources are efficiently utilized.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) toncoin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

notcoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	notcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	6.45054	kWh/a

Qualitative information

S.4 Consensus Mechanism

Toncoin utilizes a Proof of Stake (PoS) model with the Catchain consensus algorithm to provide a secure, scalable, and efficient multi-chain environment.

Core Components of Toncoin's Consensus:

1. Proof of Stake (PoS) with Validators:
   Validator Role: Validators are required to stake Toncoin to participate in consensus. They validate transactions and secure the network by processing blocks and maintaining network integrity.

2. Catchain Consensus Algorithm:
   - High Scalability and Speed: The Catchain consensus protocol is specifically designed for Toncoin's multi-chain architecture, optimizing for fast and scalable operations across multiple shards.
   - Multi-Chain Compatibility: Catchain supports a sharded environment, allowing different chains (or shards) to reach consensus efficiently. This approach enhances the network's ability to process a high volume of transactions in parallel.
3. Byzantine Fault Tolerance (BFT):
   Fault Tolerance: The Catchain protocol is Byzantine Fault Tolerant (BFT), meaning it can tolerate some level of malicious or faulty behavior among validators. This BFT compliance ensures that the network remains secure and functional even when a minority of validators act maliciously.
4. Validator Rotation and Slashing:
   - Regular Rotation: Validators are rotated regularly to enhance decentralization and security. This system prevents any single validator or group from maintaining control over consensus indefinitely.
   - Slashing for Malicious Behavior: Validators who act maliciously or fail to perform their duties may be penalized through slashing, losing a portion of their staked Toncoin. This discourages dishonest behavior and promotes reliable network participation.

S.5 Incentive Mechanisms and Applicable Fees

Toncoin incentivizes network security, participation, and efficiency through staking rewards, transaction fees, and slashing penalties.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   Rewards for Securing the Network: Validators earn staking rewards for actively participating in the network's consensus process and ensuring its security. These rewards are provided in Toncoin and are proportional to each validator's staked amount, encouraging validators to maintain their roles responsibly.
2. Transaction Fees:
   Ongoing Income for Validators: Validators also receive a share of transaction fees from the blocks they validate, providing a consistent reward that grows with network usage. This additional income incentivizes validators to process transactions accurately and efficiently.
3. Decentralization through Validator Rotation:
   Fair and Balanced Participation: The frequent rotation of validators ensures that new participants can join the validator set, promoting decentralization and preventing monopolization of the network by a small group of validators.
4. Slashing Mechanism:
   Penalties for Dishonest Behavior: To maintain security, Toncoin enforces a slashing mechanism that penalizes validators who act maliciously or fail to fulfill their duties. This risk of losing staked Toncoin encourages validators to behave honestly and fulfill their responsibilities.

Applicable Fees:

Transaction Fees: Transaction fees on the TON blockchain are paid in Toncoin. These fees vary based on transaction complexity and network demand, ensuring that validators are compensated for their work and that resources are efficiently utilized.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) toncoin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Hamster Kombat

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Hamster Kombat	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	6.45054	kWh/a

Qualitative information

S.4 Consensus Mechanism

Toncoin utilizes a Proof of Stake (PoS) model with the Catchain consensus algorithm to provide a secure, scalable, and efficient multi-chain environment.

Core Components of Toncoin's Consensus:

1. Proof of Stake (PoS) with Validators:
   Validator Role: Validators are required to stake Toncoin to participate in consensus. They validate transactions and secure the network by processing blocks and maintaining network integrity.
2. Catchain Consensus Algorithm:
   - High Scalability and Speed: The Catchain consensus protocol is specifically designed for Toncoin's multi-chain architecture, optimizing for fast and scalable operations across multiple shards.
   - Multi-Chain Compatibility: Catchain supports a sharded environment, allowing different chains (or shards) to reach consensus efficiently. This approach enhances the network's ability to process a high volume of transactions in parallel.

3. Byzantine Fault Tolerance (BFT):
   Fault Tolerance: The Catchain protocol is Byzantine Fault Tolerant (BFT), meaning it can tolerate some level of malicious or faulty behavior among validators. This BFT compliance ensures that the network remains secure and functional even when a minority of validators act maliciously.
4. Validator Rotation and Slashing:
   - Regular Rotation: Validators are rotated regularly to enhance decentralization and security. This system prevents any single validator or group from maintaining control over consensus indefinitely.
   - Slashing for Malicious Behavior: Validators who act maliciously or fail to perform their duties may be penalized through slashing, losing a portion of their staked Toncoin. This discourages dishonest behavior and promotes reliable network participation.

S.5 Incentive Mechanisms and Applicable Fees

Toncoin incentivizes network security, participation, and efficiency through staking rewards, transaction fees, and slashing penalties.

Incentive Mechanisms:

1. Staking Rewards for Validators:
   Rewards for Securing the Network: Validators earn staking rewards for actively participating in the network's consensus process and ensuring its security. These rewards are provided in Toncoin and are proportional to each validator's staked amount, encouraging validators to maintain their roles responsibly.
2. Transaction Fees:
   Ongoing Income for Validators: Validators also receive a share of transaction fees from the blocks they validate, providing a consistent reward that grows with network usage. This additional income incentivizes validators to process transactions accurately and efficiently.
3. Decentralization through Validator Rotation:
   Fair and Balanced Participation: The frequent rotation of validators ensures that new participants can join the validator set, promoting decentralization and preventing monopolization of the network by a small group of validators.
4. Slashing Mechanism:
   Penalties for Dishonest Behavior: To maintain security, Toncoin enforces a slashing mechanism that penalizes validators who act maliciously or fail to fulfill their duties. This risk of losing staked Toncoin encourages validators to behave honestly and fulfill their responsibilities.

Applicable Fees:

Transaction Fees: Transaction fees on the TON blockchain are paid in Toncoin. These fees vary based on transaction complexity and network demand, ensuring that validators are compensated for their work and that resources are efficiently utilized.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) toncoin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the

Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Gari

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Gari	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	6.23157	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Unicorn Fart Dust 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Unicorn Fart Dust	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	6.04188	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

NodeOps

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	NodeOps	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	5.84312	kWh/a

Qualitative information

S.4 Consensus Mechanism

NodeOps is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

NodeOps is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
   - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.

- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:
   - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
   - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
   - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
   - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
   - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
   - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
   - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.
2. L1 Data Fees:
   - Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
   - Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the

energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

housecoin



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	housecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	5.61819	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Bonfida

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bonfida	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	5.52794	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their

staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Bubblemaps

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Bubblemaps	/
	2025-02-04	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates		
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	5.49284	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

maple

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	maple	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	5.46160	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Gensokishi Metaver 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Gensokishi Metaver	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	5.25275	kWh/a

Qualitative information

S.4 Consensus Mechanism

Gensokishi Metaver is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Gensokishi Metaver is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Lock In

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Lock In	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	4.97974	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Toshi

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Toshi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	4.93273	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset

within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

keeta

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	keeta	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	4.84656	kWh/a

Qualitative information

S.4 Consensus Mechanism

keeta is present on the following networks: Base, Keeta.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Keeta Network utilizes a Delegated Proof of Stake (dPoS) consensus mechanism, designed to achieve rapid transaction processing while maintaining decentralization. In this system, stakeholders elect delegates who are responsible for validating transactions and producing new blocks. The network's architecture includes a structured five-step block validation process, enhancing both security and efficiency. Additionally, Keeta integrates a Directed Acyclic Graph (DAG) structure.

S.5 Incentive Mechanisms and Applicable Fees

keeta is present on the following networks: Base, Keeta.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result

is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Keeta's economic model is centered around its native token, KTA, which serves multiple functions within the ecosystem. Validators and delegators are incentivized through block rewards and transaction fees, encouraging active participation in network security and governance.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

375ai

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	375ai	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	4.41567	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

PlayDapp

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	PlayDapp	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	4.25579	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

titcoin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	titcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	4.14575	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Fidelity Digital

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Fidelity Digital	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	4.11393	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Degen



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Degen	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	4.10382	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier

Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

sigma 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	sigma	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	4.07555	kWh/a

Qualitative information

S.4 Consensus Mechanism

sigma is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides

a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

sigma is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Alkimi

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Alkimi	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	3.54649	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks,

but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

mango

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	mango	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	3.50312	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

solv



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	solv	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	3.24817	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Cookie DAO

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Cookie DAO	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	3.24112	kWh/a

Qualitative information

S.4 Consensus Mechanism

Cookie DAO is present on the following networks: Base, Binance Smart Chain.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently

active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Cookie DAO is present on the following networks: Base, Binance Smart Chain.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the

Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

saber

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	saber	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	3.21899	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

virtua

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	virtua	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	3.19184	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

satlayer

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	satlayer	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	3.04983	kWh/a

Qualitative information

S.4 Consensus Mechanism

satlayer is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an

entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

satlayer is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result

is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

flock_io

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	flock_io	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/

Field	Value	Unit
S.8 Energy consumption	3.02074	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

europ

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	europ	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2.62441	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Merit Circle

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Merit Circle	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2.41212	kWh/a

Qualitative information

S.4 Consensus Mechanism

Merit Circle is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Merit Circle is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Soma Finance



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Soma Finance	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2.12790	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

checkmate

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	checkmate	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	2.05955	kWh/a

Qualitative information

S.4 Consensus Mechanism

checkmate is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

checkmate is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

definitive

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	definitive	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.94511	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

ghiblification 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	ghiblification	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.85518	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Impossible Cloud Network

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Impossible Cloud Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.85208	kWh/a

Qualitative information

S.4 Consensus Mechanism

Impossible Cloud Network is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only

validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Impossible Cloud Network is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy

consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Mubarak 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Mubarak	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.80685	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.

- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

freestyle_classic

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	freestyle_classic	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.77549	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.

9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Jeo Boden 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Jeo Boden	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	1.75657	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.

- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of

the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

intuition 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	intuition	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.67985	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal

request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

moonveil 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	moonveil	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.65181	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through

staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.

3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

KAITO



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	KAITO	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.41459	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier

Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

cfb_benchmarks

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	cfb_benchmarks	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.34873	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

B3

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	B3	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.14613	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many

L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Abc Labs

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Abc Labs	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.10865	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus

mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

xterio

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	xterio	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.08858	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the

energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

test

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	test	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.01682	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.

- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Sapien

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Sapien	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	1.01023	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

freysa

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	freysa	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.90026	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of

the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Stool Prisondente



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Stool Prisondente	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.85322	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

estatex

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	estatex	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.84133	kWh/a

Qualitative information

S.4 Consensus Mechanism

estatex is present on the following networks: Base, Binance Smart Chain.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

estatex is present on the following networks: Base, Binance Smart Chain.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

auki

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	auki	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.69250	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

forest 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	forest	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.64702	kWh/a

Qualitative information

S.4 Consensus Mechanism

forest is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

forest is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Particle Network



Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Particle Network	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.60488	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of

being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network’s security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Sogni AI

Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Sogni AI	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.52589	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the

network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

GreenSatoshiToken

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	GreenSatoshiToken	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	0.39514	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

odos

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	odos	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/

Field	Value	Unit
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.34617	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

rize

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	rize	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.30045	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier

Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Crust Shadow

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Crust Shadow	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.14186	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

oobit

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	oobit	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	0.14186	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

unite

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	unite	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.09361	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Ls Solana

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/

Field	Value	Unit
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Ls Solana	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.00334	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network’s criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Raiin

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Raiin	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.00154	kWh/a

Qualitative information

S.4 Consensus Mechanism

Raiin is present on the following networks: Base, Sei.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Sei leverages its Twin-Turbo consensus mechanism, integrating advanced transaction processing techniques with the reliability of Tendermint Core, to achieve high performance and security.

Core Components:

- Twin-Turbo Consensus:
  - Optimistic Block Processing: Validators process transactions optimistically, assuming their validity, reducing latency and increasing throughput.
  - Intelligent Block Propagation: Compressed block proposals containing transaction hashes enable validators to reconstruct blocks locally, expediting consensus.
  - Single Slot Finality: Ensures immediate block finality upon addition, eliminating the need for confirmations and minimizing the risk of chain reorganizations.
- Tendermint Core Integration:
  Incorporates Byzantine Fault Tolerance (BFT) to maintain security and resilience, safeguarding the network against malicious actors.

S.5 Incentive Mechanisms and Applicable Fees

Raiin is present on the following networks: Base, Sei.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The Sei Network incentivizes participation through staking rewards and a transparent fee structure, supporting its decentralized ecosystem.

Incentive Mechanisms:

- Staking Rewards: Validators and delegators earn SEI tokens as rewards for securing the network through staking, promoting active engagement and long-term commitment.

- Governance Participation: SEI token holders can participate in network governance decisions, influencing protocol upgrades and key changes.

Applicable Fees:

Transaction Fees: Users pay fees in SEI tokens for network transactions. These fees are distributed to validators and delegators as rewards, supporting network operations and security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, sei is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Backstage

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Backstage	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

linkka

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	linkka	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
   - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
   - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
   Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
   Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Black Mirror Experience Token

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	Black Mirror Experience Token	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/

Field	Value	Unit
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network’s security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
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   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

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   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
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S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

revive

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	revive	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

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9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
   - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
   - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
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4. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
   - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
   - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
   - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
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3. Cross-Chain Fees:
   Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
   Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

moons



Quantitative information

Field	Value	Unit
S.1 Name		/

Field	Value	Unit
	Payward Global Solutions Limited	
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	moons	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

moons is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
   - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
   - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
   - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:
   Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
   - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
   - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
   - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
   - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:
   - Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
   - Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.
2. Delegation:
   Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.
3. Economic Security:
   Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

moons is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
   - Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
   - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
   - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
   - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
   - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain
4. Transaction Fees:
   - Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
   - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
   Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
   State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

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genshiro

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	genshiro	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called “Cabinet Members”): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network’s security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
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active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

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Fees on the Binance Smart Chain

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S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

traceability

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	traceability	/

Field	Value	Unit
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a

precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

envision

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	envision	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

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Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

My Neighbor Alice 

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	My Neighbor Alice	/
S.6 Beginning of the period to which the disclosure relates	2025-02-03	/
S.7 End of the period to which the disclosure relates	2026-02-03	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
   - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
   - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):
   - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
   - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:
   Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:
   A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:
   The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:
   Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
   - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
   - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.
2. Security:
   - Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
   - Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.
3. Economic Penalties:
   Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
   - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
   - Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
2. Delegators:
   - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
3. Economic Security:
   - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
   - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:
   Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:
   Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:
   State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:
   Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the

network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

hybrid

Quantitative information

Field	Value	Unit
S.1 Name	Payward Global Solutions Limited	/
S.2 Relevant legal entity identifier	9845003D98SCC2851458	/
S.3 Name of the crypto-asset	hybrid	/
S.6 Beginning of the period to which the disclosure relates	2025-02-04	/
S.7 End of the period to which the disclosure relates	2026-02-04	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
   - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
   - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
   - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
   - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
   - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
   - Binary Confidence: Confidence counters are used to track the preferred binary decision.
   - Finality: When a binary decision reaches a certain confidence level, it becomes final.
3. Avalanche Protocol:
   - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
   - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.

- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

S.5 Incentive Mechanisms and Applicable Fees

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.
Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.
Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network’s inflationary issuance of AVAX tokens.
Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior.Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:
   - Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
   - Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.
2. Smart Contract Fees:
   Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:
   New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

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