Filecoin Network MiCA Sustainability Indicators

December 2024

Prepared according to the standards set forth in Annex IV of the ESMA *Final Report: Draft Technical Standards specifying certain requirements of the Markets in Crypto Assets Regulation (MiCA) – second package* for the mandatory disclosures for Crypto-Asset Service Providers.

Type	Sustainability Indicator	Result
Energy	S.8 Energy Consumption[1]	1,672,047 kWh/year[2]
	S.10 Renewable energy consumption[3]	36.4%
	S.11 Energy intensity[4]	0.0153 kWh/Tx
GHG Emissions	S.12 Scope 1 - Controlled[5]	0 tonnes CO2e/year
	S.13 Scope 2 - Purchased[6]	835 tonnes CO2e/year
	S.14 GHG Intensity[7]	0.0000244 kg CO2e per Tx

The chart above provides information about validation of transactions and the maintenance of the blockchain by those validators, providing information that is comparable across CASPs disclosures. In addition to validating transactions and maintaining the Filecoin blockchain, Storage Providers participating in the Filecoin network also consume energy sealing and storing data, which is not included in the chart above. While these activities require energy, as described in the following chart, that energy use would also be necessary if the data were stored elsewhere.

[1] Total amount of energy used for the validation of transactions and the maintenance of the integrity of the distributed ledger of transactions, expressed per calendar year.
[2] By way of comparison, BTC is estimated at 163.7 billion kWh/year and ETH at 5,938,595.2 kWh/year.
[3] Share of energy used generated from renewable sources, expressed as a percentage of the total amount of energy used per calendar year, for the validation of transactions and the maintenance of the integrity of the distributed ledger of transactions.
[4] Average amount of energy used per validated transaction.
[5] Scope 1 GHG emissions per calendar year for the validation of transactions and the maintenance of the integrity of the distributed ledger of transactions.
[6] Scope 2 GHG emissions per calendar year for the validation of transactions and the maintenance of the integrity of the distributed ledger of transactions.
[7] Average GHG emissions (scope 1 and scope 2) per validated transaction.

Type	Sustainability Indicator	Result
Storage Energy	Energy Consumption	380,789,000 kWh/year
	Renewable energy consumption	34.3%
	Energy intensity	8.3 kWh/Tx
GHG Emissions	Scope 1 - Controlled	0 tonnes CO2e/year
	Scope 2 - Purchased	204,172 tonnes CO2e/year
	GHG Intensity	4.5 kg CO2e per Tx

Sources and Methodology

Sources

- "Elecricity Consumption and Carbon Footprint of the Filecoin Network" Accessed 19 December, 2024. CCRI (2024).
- Filecoin Node Location Endpoint. Filecoin Energy Dashboard. Accessed: 15 December, 2024.
- "IRENASTAT Online Data Query Tool". International Renewable Energy Agency. 2024.
- Pick, Jim. "Documentation: Synthetic Locations [Provider.Quest]", 2022.

Filecoin Renewable Energy Consumption and Intensity

S.10 Renewable Energy Consumption

The Filecoin Energy Consumption for maintenance of the blockchain was determined using CCRI's methods (CCIR, 2024). Provider locations were determined using previously published methods (Pick, 2022) and accessed via the energy dashboard (Filecoin Node Location Endpoint, 2024). To arrive at the geographic distribution of this portion of Filecoin energy use, energy use was divided evenly between nodes as shown in the Appendix.

Renewable energy share was determined using the Renewable Energy share of electricity capacity for 2023, provided by the International Renewable Energy Agency (IRENASTAT, 2024). This was used to determine the renewable energy used by the Filecoin Network in each country represented. Annualized energy use and RE share by country are shown below (Appendix).

S.11 Energy intensity

The annualized number of Filecoin transactions was determined by CCRI to be 109,084,265 (CCRI, 2024). The energy intensity was arrived at by dividing indicator S.8 by this value.

Appendix

Country	RE Share	Node Count	Node Count Fraction	kWh / year	RE kWh/year
AE	13.80%	35	0.27%	4,451.7	614.3
AR	35.26%	65	0.49%	8,267.4	2,915.1
AT	84.97%	4	0.03%	508.8	432.3
AU	51.50%	230	1.75%	29,253.8	15,065.7
BE	54.56%	9	0.07%	1,144.7	624.6
BG	47.58%	8	0.06%	1,017.5	484.1
BR	85.71%	5	0.04%	636.0	545.1
BY	5.48%	6	0.05%	763.1	41.8
CA	69.83%	229	1.74%	29,126.6	20,339.1
CH	83.45%	6	0.05%	763.1	636.8
CN	49.77%	5737	43.64%	729,692.2	363,167.8
CZ	22.71%	6	0.05%	763.1	173.3
DE	63.28%	350	2.66%	44,516.7	28,170.2
DK	70.57%	5	0.04%	636.0	448.8
ES	62.21%	18	0.14%	2,289.4	1,424.3
FI	59.46%	15	0.11%	1,907.9	1,134.4
FR	45.23%	21	0.16%	2,671.0	1,208.1
GB	51.70%	102	0.78%	12,973.4	6,707.3
GH	31.04%	1	0.01%	127.2	39.5
GR	60.64%	1	0.01%	127.2	77.1
HK	2.32%	1556	11.84%	197,908.5	4,591.5
HR	72.51%	12	0.09%	1,526.3	1,106.7
ID	14.62%	25	0.19%	3,179.8	464.9
IE	48.78%	2	0.02%	254.4	124.1
IL	20.49%	1	0.01%	127.2	26.1
IN	35.16%	5	0.04%	636.0	223.6
IR	13.54%	6	0.05%	763.1	103.3
IS	95.80%	1	0.01%	127.2	121.8
IT	51.43%	6	0.05%	763.1	392.5
JP	34.84%	288	2.19%	36,630.9	12,762.2
KR	20.19%	1587	12.07%	201,851.4	40,753.8

LK	62.93%	1	0.01%	127.2	80.0
LT	52.51%	1	0.01%	127.2	66.8
LV	67.73%	4	0.03%	508.8	344.6
MK	50.76%	2	0.02%	254.4	129.1
MX	28.08%	1	0.01%	127.2	35.7
MY	22.81%	43	0.33%	5,469.2	1,247.5
NG	20.88%	1	0.01%	127.2	26.6
NL	59.14%	147	1.12%	18,697.0	11,057.4
NO	98.21%	17	0.13%	2,162.2	2,123.5
NZ	80.70%	5	0.04%	636.0	513.2
PH	26.94%	9	0.07%	1,144.7	308.4
PL	44.18%	13	0.10%	1,653.5	730.5
PT	77.56%	2	0.02%	254.4	197.3
RO	62.23%	22	0.17%	2,798.2	1,741.3
RS	36.83%	13	0.10%	1,653.5	609.0
RU	20.74%	44	0.33%	5,596.4	1,160.7
SA	3.26%	1	0.01%	127.2	4.1
SE	78.71%	13	0.10%	1,653.5	1,301.5
SG	8.80%	591	4.50%	75,169.6	6,614.9
SI	47.77%	6	0.05%	763.1	364.6
SK	33.32%	1	0.01%	127.2	42.4
TH	21.37%	15	0.11%	1,907.9	407.7
TW	27.50%	59	0.45%	7,504.2	2,063.7
UA	24.79%	33	0.25%	4,197.3	1,040.5
US	31.53%	1712	13.02%	217,750.2	68,656.6
VN	55.57%	47	0.36%	5,978.0	3,322.0
ZA	17.04%	1	0.01%	127.2	21.7