Energy-related ESG Metrics

This disclosure is published in accordance with the Principle Adverse Impact (PAI) requirement under the Commission Delegated Regulation (EU) 2025/422 published on March 31, 2025, that specifies the content, methodologies, and presentation of information regarding climate and environmental impacts for crypto-assets under the [Markets in Crypto-assets Regulation (MiCA)]() (EU) 2023/1114.

Although CF Technologies does not issue any digital assets, the Company recognizes its' obligation as a crypto asset service provider to disclose information related to the principal climate and environmental adverse impacts associated with the consensus mechanisms of the crypto assets made available to its customers.

Environmental Considerations of Consensus Mechanisms

1. Energy Consumption

Consensus mechanisms such as Proof-of-Work (PoW) (e.g., *Bitcoin*) rely on miners performing complex computational tasks to validate transactions and secure networks. These operations are highly energy-intensive, often exceeding 500,000 kWh as network participation increases.

By contrast, Proof-of-Stake (PoS) mechanisms (e.g., *Ethereum, Tron, Solana, FastToken*) are significantly more energy-efficient, typically consuming below 500,000 kWh, thereby offering a lower environmental footprint.

2. Carbon Emissions

The carbon intensity of PoW networks depends heavily on the energy mix used by miners. In regions reliant on fossil fuels, mining contributes substantially to CO_2 and greenhouse gas emissions. Even where renewable energy sources are available, miners often operate on mixed grids that include non-renewable components.

In contrast, PoS and other modern consensus mechanisms achieve markedly lower emissions per transaction due to their minimal energy requirements.

3. Electronic Waste (E-Waste)

PoW mining requires specialized hardware that becomes obsolete as mining difficulty increases and more efficient models emerge. This leads to the generation of electronic waste (e-waste), much of which is difficult to recycle and frequently ends up in landfills. PoS systems, requiring no dedicated mining equipment, mitigate this issue almost entirely.

While no blockchain is entirely free from environmental impact, ongoing innovation, governance improvements, and renewable energy integration are essential to building a more sustainable digital asset ecosystem.

Understanding Carbon Neutrality

Term	*Definition*
Carbon footprint	Total greenhouse gas (GHG) emissions generated by an activity.
Carbon credit	A tradable certificate allowing one tonne of CO_2 equivalent emissions.
Carbon offset	Actions compensating for emissions, e.g., reforestation or carbon capture.
Carbon neutrality	Achieved when total emissions are balanced through reduction or offset initiatives.

Global frameworks now support tokenized carbon credits and blockchain-based offset tracking, promoting transparency and integrity in carbon markets.

Pathways Toward Carbon Neutrality in Crypto

- Energy-efficient consensus mechanisms: The migration from PoW to PoS has reduced energy consumption by over 99% for networks like *Ethereum*.
- Renewable energy adoption: Approximately 39% of Bitcoin mining is now powered by renewables (hydro, wind, or solar).
- Carbon capture and offset programs: Projects supporting forest preservation, renewable power, and verified carbon credits are on the rise.
- Tokenized carbon markets: Initiatives such as the Crypto Climate Accord, Energy Web, and Ripple's carbon-neutral XRP Ledger exemplify how blockchain innovation aligns with global sustainability goals.

The table below presents the required information regarding the principal adverse impacts of the consensus mechanism on climate and other environmental factors.

Name	LEI	Name of crypto-asset	Consensus Mechanism Proof of Work / Proof of Stake	Incentive mechanism and Applicable fees	Beginning of period of disclosed information yyyy-mm-dd	End of period of disclosed information yyyy-mm-dd	Energy Consumption (Kwh/a) Decimal – 18/5	Energy Consumption Sources and Methodologies	Internal use only
CF Technologies Limited	98450091A6D61FB36406	Bitcoin	Proof of Work (PoW)	**Block Rewards:** Miners receive newly minted bitcoins for validating blocks. Rewards halve approximately every four years (“halving”), capping total supply at 21 million and creating scarcity. **Transaction Fees:** Users pay fees to incentivize miners. Fees are market-driven, with higher fees prioritizing faster processing, particularly during network congestion. Energy consumption and Lightning Network transactions are included in calculations, reflecting the Digital Token Identifier Foundation’s categorization for the functionally fungible group (FFG). Excluding Lightning transactions would significantly increase per-transaction estimates.	2024-11-12	2025-11-12	244,849,939,359.4213	Energy consumption is estimated using a top-down approach based on economically rational miner behavior, SHA-256 hardware efficiency, network activity, and FFG DTI mappings, applying conservative assumptions per EU regulatory guidance.	https://www.bankfrick.li/en/bitcoin
CF Technologies Limited	98450091A6D61FB36406	Ethereum	Proof of Stake (after merge)	The network security is ensured through economic incentives and penalties applied to validators. Validators must stake a minimum of 32 ETH and are compensated for contributing to block production, attestation, and sync committee duties. **Rewards** consist of newly issued ETH and transaction fees. **Transaction fees** are divided into a burned base fee and an optional priority fee payable to validators, under the EIP-1559 fee model. Misconduct results in slashing, while inactivity triggers proportional penalties. This framework aligns validator behaviour with network security objectives and introduces a more predictable, and potentially deflationary, fee structure during periods of elevated network usage.	2024-11-13	2025-11-13	2,159,953.20000	A bottom-up approach is used. The network’s energy consumption is primarily driven by node operations. Estimates are based on empirical data gathered through public information sources, open-source tools, and proprietary crawlers. Hardware characteristics are derived from the technical requirements of the client software, and device energy usage is measured in certified laboratories. Where possible, the Functionally Fungible Group Digital Token	https://www.bankfrick.li/en/ethereum-eth

								Identifier (FFG DTI) is used to identify all relevant implementations of the crypto-asset, with mappings updated regularly using information from the Digital Token Identifier Foundation. Assumptions regarding hardware types and participant numbers are validated on a best-effort basis using available empirical evidence. Participants are generally assumed to act in an economically rational manner.	
CF Technologies Limited	98450091A6D 61FB36406	Bitcoin Cash	Proof of Work (PoW)	**Block Rewards:** Miners receive newly minted bitcoins for validating blocks. Rewards halve approximately every four years ("halving"), capping total supply at 21 million and creating scarcity. **Transaction Fees:** Users pay fees to incentivize miners. Fees are market-driven, with higher fees prioritizing faster processing, particularly during network congestion. **SmartBCH Incentives and Fees:** Validators are rewarded with a share of transaction fees for securing the sidechain and validating transactions. Fees, paid in BCH, align validator incentives with network stability and efficient transaction processing.	2024-11-12	2025-11-12	1,108,928,40 7.56520	The asset's energy consumption is estimated using both **top-down** and **bottom-up** approaches: **Top-down:** Focuses on miners as the primary energy consumers. Energy use is calculated based on hardware efficiency (SHA-256), miner revenue opportunities, and network profitability thresholds. Merge mining is considered where relevant. **Bottom-up:** Focuses on network nodes, using empirical data from public sources and in-house crawlers. Hardware requirements and energy consumption are measured in certified labs.	https://www.bankfrick.li/en/bitcoin-cash

								For both approaches, the **Functionally Fungible Group Digital Token Identifier (FFG DTI)** is used to capture all implementations of the asset. Assumptions are based on best-effort empirical data and conservatively estimate adverse impacts.	
CF Technologies Limited	98450091A6D61FB36406	Cardano	Proof of Stake	**Staking Rewards:** - Validators (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 validators. 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. **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. **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.	2024-11-13	2025-11-13	813,103.20000	A bottom-up approach is 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, if available, we use - 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 regularly, based on data of the	https://www.bankfrick.li/en/cardano-ada

				Transaction Fees: 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. **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.				Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational.	
CF Technologies Limited	98450091A6D 61FB36406	Shiba Inu	Token/ No consensus mechanism	n/a	2025-01-01	2025-04-23	1,945.78478	Data Source: www.micacrypto alliance.com/ methodologies	Micacryptoal liance.com
CF Technologies Limited	98450091A6D 61FB36406	Ripple	XRP Ledger Consensus Protocol (XRP LCP)	On the XRP Ledger, a minimal **transaction fee** is applied to each transaction, which is permanently burned (**transaction burn**), reducing the total supply and preventing network spam.	2025.01.01	2025.04.23	123,362.958 90	Data Source: www.micacrypto alliance.com/ methdologies	Micacryptoal liance.com
CF Technologies Limited	98450091A6D 61FB36406	USDC	Token/ No consensus mechanism	n/a	2025.01.01	2025.04.23	22,584.6856 6	Data Source: www.micacrypto alliance.com/ methodologies	Micacryptoal liance.com
CF Technologies Limited	98450091A6D 61FB36406	TRON	Proof of Stake	On the TRON network, Super Representatives (SRs) receive **block producer rewards** for validating and producing blocks, while TRX holders earn **staking and delegation rewards** by participating directly or indirectly in network operations. Users pay **gas fees** to execute transactions and smart contracts, and a portion of TRX may be permanently burned through **transaction burn**, reducing total	2025.01.01	2025.04.23	4,936,206.28 300	Data Source: www.micacrypto alliance.com/ methdologies	Micacryptoal liance.com

				supply and discouraging spam. TRX holders also have **governance rights**, allowing them to vote for SRs and participate in protocol decisions, supporting decentralized and sustainable network management.					
CF Technologies Limited	98450091A6D61FB36406	Polkadot	Proof of Stake	**Block producer rewards** incentivize validators who create new blocks, while **staking rewards** and **delegation rewards** encourage DOT holders to lock or delegate tokens to support network security, promoting long-term, inclusive participation. **Transaction (Tx) fees** and **gas fees**, paid in DOT, reflect the computational resources required for network operations, with lower fees indicating more energy-efficient protocols, relevant for environmental reporting. Some DOT may be **burned in certain operations** to manage supply, demonstrating economic sustainability. **Governance rights** allow DOT holders to vote on network decisions, ensuring transparency and accountability.	2025.01.01	2025.07.02	471,952.62152	Data source: www.micacryptoalliance.com/methdologies	One trading
CF Technologies Limited	98450091A6D61FB36406	Binance Coin	Proof of Stake	**Block producer rewards** incentivize validators who create new blocks on the network**. Staking rewards** and **delegation rewards** encourage BNB holders to lock or delegate tokens to support network security, promoting long-term, inclusive participation. **Transaction (Tx) fees** and **gas fees**, paid in BNB, reflect the computational resources required for network operations, with lower fees indicating more energy-efficient protocols,important for environmental reporting. In some cases, BNB may be **burned through mechanisms** like the quarterly BNB burn to reduce supply, demonstrating economic sustainability. **Governance rights** allow BNB holders to participate in network decisions, ensuring transparency and accountability.	2025.01.01	2025.07.02	170,218.05532	Data source: www.micacryptoalliance.com/methdologies	One trading
CF Technologies Limited	98450091A6D61FB36406	Solana	Proof of Stake	**Block producer rewards** incentivize validators (leaders) to create new blocks, while **staking rewards** encourage validators to lock their own SOL to secure the network. **Delegation rewards** allow SOL holders to delegate tokens to validators and earn a share of their rewards, promoting	2025.01.01	2025.07.02	18,566,026.34101	Data source: www.micacryptoalliance.com/methdologies	One trading

				decentralization and long-term participation. **Transaction (Tx) fees**, paid in SOL, compensate validators for computational resources, while **gas fees** are integrated into Tx fees, keeping costs low and supporting high-throughput operations. Additionally, a portion of **transaction fees may be burned**, helping manage SOL supply and demonstrating economic sustainability.					
CF Technologies Limited	98450091A6D 61FB36406	Litecoin	Proof of Work	Litecoin incentivizes miners primarily through **block rewards and transaction fees**. When miners successfully add a new block to the blockchain, they receive a fixed amount of newly minted LTC, currently **6.25 LTC following the 2023 halving**. In addition to this reward, miners also collect the transaction fees paid by users for including their transactions in the block. Together, these two incentives motivate miners to contribute computational power to secure the network and maintain its ongoing operation.	2025.01.01	2025.07.02	7,082,950,85 3.66006	Data source: www.micacrypto alliance.com/ methdologies	One trading
CF Technologies Limited	98450091A6D 61FB36406	Dogecoin	Proof of Work	Dogecoin incentivizes miners primarily through **block rewards** and **transaction fees**. When a miner successfully mines a new block, they receive a fixed reward of **10,000 DOGE**, providing a predictable and steady incentive. In addition to this block reward, miners also collect **transaction fees** paid by users for including their transactions in the block. Together, these rewards motivate miners to secure the network and maintain its operations.	2025.01.01	2025.07.02	8,570,995,00 8.89045	Data source: www.micacrypto alliance.com/ methdologies	One trading
CF Technologies Limited	98450091A6D 61FB36406	FastToken	Proof of Stake	FTN on Ethereum functions as an ERC-20 utility and reward token, providing incentives through airdrops, points-based rewards for holding or staking, and participation in the SoftConstruct Crypto Reward Program (SCRP), while burn-and-buyback mechanisms reduce circulating supply and can enhance token value. It is also used across Ethereum-compatible platforms for payments, DeFi, gaming, and affiliate rewards, encouraging active ecosystem participation. All FTN transactions incur **Ethereum network gas fees paid in ETH**,	2024-11-13	2025-11-13	2,159,953.20 000	A bottom-up approach is used. The network's energy consumption is primarily driven by node operations. Estimates are based on empirical data gathered through public information sources, open-source tools, and proprietary crawlers. Hardware characteristics are derived from the	https://www. bankfrick.li/e n/ethereum- eth

				and any additional project-level fees, such as for bridge operations or staking programs, are determined by the Fasttoken ecosystem.				technical requirements of the client software, and device energy usage is measured in certified laboratories. Where possible, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used to identify all relevant implementations of the crypto-asset, with mappings updated regularly using information from the Digital Token Identifier Foundation. Assumptions regarding hardware types and participant numbers are validated on a best-effort basis using available empirical evidence. Participants are generally assumed to act in an economically rational manner.	

The table below is the supplementary information on principal adverse impacts on the climate and other environment-related adverse impacts of the consensus mechanism for those crypto-assets exceeding Energy Consumption of 0.5 GWh/year

Name of Crypto-asset	Renewable energy consumption %	Energy intensity kWh	Scope 1 DLT GHG emissions-Controlled tCO2e/a	Scope 2 DLT GHG emissions – Purchased tCO2e/a	GHG intensity kgCO2e	Key energy sources and methodologies	Key GHG sources and methodologies
Bitcoin	29.306425042	7.24340	0.00000	100877210.63319	2.98425	**Renewable Energy Usage** The geographic locations of nodes are determined via public sources, open-source crawlers, and in-house tools. If unavailable, comparable reference networks are used based on consensus mechanism and incentive structure. Node locations are combined with public data on renewable electricity from *Our World in Data* (Ember 2025; Energy Institute 2024). Energy intensity is calculated as the marginal energy cost per additional transaction. **References:** Ember (2025); Energy Institute (2024); Our World in Data, *Share of electricity generated by renewables*. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables	**GHG Emissions** Node locations are identified using public sources, open-source crawlers, and in-house tools. If unavailable, comparable reference networks are used based on consensus mechanism and incentive structure. Node locations are combined with electricity carbon intensity data from *Our World in Data* (Ember 2025; Energy Institute 2024). Emissions intensity is calculated as the marginal GHG emissions per additional transaction. **References:** Ember (2025); Energy Institute (2024); Our World in Data, *Carbon intensity of electricity generation*. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity
Ethereum	32.225548601	0.00008	0.00000	718.86066	0.00003	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 with respect to 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,	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 with respect to 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].

						"Statistical Review of World Energy" [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.	Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity
Bitcoin Cash	29.306425042	0.17087	0.00000	456874.13621	0.07040	Node locations are determined using public sources, open-source crawlers, and in-house tools. If unavailable, comparable reference networks are used. Geographic data are combined with electricity generation data from *Our World in Data* (Ember 2025; Energy Institute 2024). Renewable energy share is calculated as the marginal energy use per additional transaction. **Reference:** Ember (2025); Energy Institute (2024); *Our World in Data, Share of electricity generated by renewables*. Data Source: https://ourworldindata.org/grapher/share-electricity-renewables.	GHG emissions are estimated by determining node locations using public sources, open-source crawlers, or in-house tools; if unavailable, comparable reference networks are used. Node locations are combined with electricity carbon intensity data from Our World in Data (Ember 2025; Energy Institute 2024). Emissions intensity is calculated marginally, relative to one additional transaction. Data source: https://ourworldindata.org/grapher/carbon-intensity-electricity
Cardano	31.805944181	0.00114	0.00000	273.81815	0.00039	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.	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
TRON	0.34124	0.00264	0.00000	1777.04786	0.00095	www.micacrypto alliance.com/ methodologies	www.micacrypto alliance.com/ methdologies
Solana	0.4637799772	0.00052	0.00000	4,678.79081	0.00013	www.micacrypto alliance.com/ methodologies	www.micacrypto alliance.com/ methdologies

Litecoin	0.4135380648	100.83245	0.00000	2,228,987.59877	31.73173	www.micacrypto alliance.com/ methodologies	www.micacrypto alliance.com/ methdologies
Dogecoin	0.4135380648	349.87108	0.00000	2,711,251.12384	110.67424	www.micacrypto alliance.com/ methodologies	www.micacrypto alliance.com/ methdologies
FastToken	32.225548601	0.00010	0.00000	718.86066	0.00003	To determine the proportion of renewable energy usage for FTN transactions, the geographic locations of Ethereum validator nodes are identified using public information sites, open-source crawlers, and in-house developed crawlers. If no node location information is available, reference networks with similar incentivization structures and consensus mechanisms are used. This geographic data is merged with public datasets on electricity generation from **Our World in Data**, specifically the share of electricity generated by renewables from Ember (2025) and the Energy Institute – Statistical Review of World Energy (2024). The energy intensity is calculated as the **marginal energy cost of processing one additional transaction**. (Ember, 2025; Energy Institute, 2024)	GHG emissions for FTN transactions are derived from the electricity consumed by Ethereum validator nodes (servers, networking, cooling). The emissions are calculated by multiplying the estimated electricity use by the carbon intensity (gCO_2e/kWh) of the regional electricity grids where nodes operate. Where exact node location is unknown, comparable reference networks are used to estimate a weighted average of emissions. This methodology aligns with **Scope 2 DLT accounting standards**, capturing purchased electricity emissions attributable to transaction validation.

Conclusion

The cryptocurrency sector is steadily advancing toward sustainability and carbon neutrality. Networks such as *Ethereum, Cardano, Solana,* and *Polkadot* showcase low-carbon innovation, while *Bitcoin* and *Litecoin* are taking steps to mitigate their impact through renewable energy and offset programs. Together, these initiatives represent a clear industry commitment to a greener, more sustainable digital asset future, balancing technological progress with environmental responsibility.