Mandatory information on principal adverse impacts on the climate and other environment-related adverse impacts of the consensus mechanism

N	Field	Content
General Information		
S.1	**Name**	Zillion Bits Ltd
S.2	**Relevant legal entity identifier**	254900FESD7AF56FOQ37
S.3	**Name of the crypto-asset**	Tron (TRX)
S.4	**Consensus mechanism**	TRX operates using a Proof of Stake (PoS) consensus mechanism whereby validators are selected to create new blocks and verify transactions based on the amount of tokens they hold and are willing to "stake" or temporarily lock as collateral. The validation process in PoS networks functions through a deterministic selection mechanism where the probability of being chosen to validate the next block is proportional to the validator's stake relative to the total staked tokens in the network. Once selected, validators verify transaction authenticity, bundle them into blocks, and append these blocks to the blockchain. Should validators attempt to approve fraudulent transactions or otherwise act dishonestly, they risk losing part or all of their staked tokens through a penalty mechanism known as "slashing," creating strong economic incentives for honest participation. Transaction finality in PoS systems is typically achieved when a sufficient number of validators confirm the validity of transactions, with exact finality mechanisms varying across different implementations. Network security in PoS systems derives from economic principles rather than computational power. From an environmental perspective, PoS consensus mechanisms demonstrate remarkable efficiency, as validators can often operate on standard server equipment or even consumer-grade hardware. The requirement to stake valuable tokens creates an inherent alignment between validators' financial interests and network integrity. As validators stand to lose their staked assets if they

		behave maliciously, the cost of attacking the network increases with its value and adoption, creating a self-reinforcing security model that scales with the network's growth without corresponding increases in energy consumption. The validator participation model also contributes to governance decentralisation, as token holders can participate in network decisions either directly or through delegation, ensuring that protocol upgrades and network parameters reflect the consensus of the broader community rather than a select group of mining operators.
S.5	**Incentive mechanisms and applicable fees**	Proof of Stake (PoS) consensus mechanisms establish an economic security model that aligns validator interests with network integrity through a financial stake. Transaction fees in PoS networks typically follow dynamic models that adjust based on network congestion and computational resource requirements. Networks employ a base fee that may be partially burned (permanently removed from circulation), creating deflationary pressure that potentially benefits long-term token holders. Additionally, systems include a priority fee or tip that goes directly to validators as an incentive to include transactions in blocks promptly. Fee structures are designed to be predictable and proportional to the computational resources consumed, with formulas accounting for transaction size and complexity to ensure fair compensation. PoS networks also implement delegation systems that extend participation beyond validators to include token holders who may not operate nodes themselves. In return, delegators receive a proportional share of the rewards earned by validators, creating a symbiotic relationship that broadens participation in network security. This arrangement enables even smaller token holders to participate in consensus and earn rewards, enhancing network decentralisation. Economic security in PoS systems is reinforced through slashing mechanisms, where validators face penalties, including the loss of staked tokens for malicious behaviour or operational failures. These penalties serve as strong deterrents against attacks or dishonest validation, as the financial loss would typically exceed potential gains from attacking the network. The economics of staking also create opportunity costs, as tokens committed to staking cannot be used for other purposes during the staking period, further incentivising honest participation.

S.6	**Beginning of the period to which the disclosure relates**	2024-01-01
S.7	**End of the period to which the disclosure relates**	2024-12-31
	Mandatory key indicator on energy consumption	
S.8	**Energy consumption (kWh/year)**	4504833.08512
	Sources and methodologies	
S.9	**Energy consumption sources and methodologies**	The methodology for assessing the energy consumption of Proof of Stake (PoS) based tokens follows a comprehensive bottom-up approach aligned with international sustainability reporting standards. This framework begins with identifying the full scope of network participants, including validator nodes, relay nodes, and other infrastructure components that contribute to the consensus mechanism. The assessment follows recognised protocols established by the International Energy Agency (IEA) and adheres to the greenhouse gas accounting principles of the World Resources Institute (WRI), ensuring alignment with standardised emissions reporting frameworks. By capturing both the direct power consumption of node hardware and the broader network infrastructure, the methodology provides a complete picture of energy utilisation throughout the distributed ledger technology network. The assessment process involves multi-stage hardware profiling, beginning with the identification of representative node configurations based on minimum system requirements published in network documentation. The measurement protocol captures both base power consumption (when nodes are connected but not actively processing transactions) and the marginal increase related to transaction validation. The aggregation methodology scales individual node measurements to the network level by applying a node distribution model based on publicly reported validator statistics. This scaling framework incorporates geographical distribution data of validators obtained from publicly accessible block explorers and network statistics portals to ensure representativeness. A conservative approach is employed when estimating hardware distribution, assuming higher-performance configurations are more prevalent than minimum-specification devices.

		The final assessment integrates transaction throughput analysis to determine energy intensity metrics and establish the relationship between network activity and power consumption. This relationship is modelled using regression analysis of power consumption against transaction volume during the measurement period, distinguishing between fixed baseline consumption for network maintenance and variable consumption for transaction processing. Quality assurance procedures include comparison against benchmark data from the European Environment Agency (EEA) and validation against methodologies employed in academic research published by sustainability-focused research institutes. The methodology explicitly accounts for both the energy required for transaction validation and the maintenance of network integrity.

Supplementary information on principal adverse impacts on the climate and other environment-related adverse impacts of the consensus mechanism

	Supplementary key indicators on energy and GHG emissions	
N	**Field**	**Content**
S.10	**Renewable energy consumption (percentage of the total amount of energy used per calendar year)**	12.93996
S.11	**Energy intensity (energy used per validated transaction in kWh)**	0.00002
S.12	**Scope 1 DLT GHG emissions – Controlled (in t CO2eq per year)**	0.00000
S.13	**Scope 2 DLT GHG emissions – Purchased (in t CO2eq per year)**	1564.32417
S.14	**GHG intensity (emissions per validated transaction in kg CO2eq)**	0.00001
	Sources and methodologies	
S.15	**Key energy sources and methodologies**	The energy mix analysis prioritises transparency in tracing electricity sources to their generation origins. Validator locations are cross-referenced with regional grid composition

		data from intergovernmental databases, such as the IEA's World Energy Balances and the United Nations Framework Convention on Climate Change (UNFCCC) emissions inventories. Renewable energy penetration rates are determined using country-level reports from the International Renewable Energy Agency (IRENA) and the Global Wind Energy Council (GWEC). For regions lacking granular data, the methodology applies default grid mixes based on the World Bank's Energy Sector Management Assistance Program (ESMAP) profiles. A key assumption is that validators procure electricity proportionally to their geographic distribution, with no preferential access to renewable energy contracts unless verified through public disclosures. The renewable share is expressed as a percentage of total consumption, incorporating adjustments for temporal variations in grid composition (e.g., seasonal hydropower availability).
S.16	**Key GHG sources and methodologies**	Greenhouse gas (GHG) emissions are quantified using a location-based approach, aligning with the GHG Protocol's Scope 2 guidance. Emission factors for electricity generation are sourced from the EEA's CO_2 Intensity of Electricity Generation reports and the U.S. Environmental Protection Agency's (EPA) Emissions & Generation Resource Integrated Database (eGRID). Regional factors are weighted by validator distribution, with cross-border electricity trading accounted for via ENTSO-E transparency platform data. The methodology assumes that validators lack direct control over energy sourcing (e.g., no verified power purchase agreements), necessitating reliance on grid-average emission factors. Methane and nitrous oxide emissions from fossil fuel-based generation are included using IPCC Tier 1 coefficients. Uncertainties arising from incomplete validator location data are mitigated by applying conservative estimates from the IEA's Global Energy Review. The results are presented as annual CO_2-equivalent emissions, with a clear distinction between Scope 1 (direct) and Scope 2 (indirect) contributions, though Scope 1 is typically negligible for PoS networks.