

Energy and Environmental Considerations in the Metaverse

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The tremendous popularity of social networks and advances in virtual reality (VR) and distributed ledger technology are helping to usher in a new technological frontier: an emerging computer-generated universe often called Metaverse

The Metaverse allows users to do almost everything they do in real life: run businesses, buy real estate and build virtual office spaces, sign and enforce contracts, interact with colleagues, trade artwork and other digital assets in the form of non-fungible tokens, and more. Central to the emerging Metaverse ecosystem is blockchain technology, decentralized public ledgers that record the ownership and sale of cryptographic assets, including non-fungible tokens that can represent parcels within a metaverse, without the need for third-party intermediaries by using trustless consensus protocols.

Blockchain and Energy Usage

Because the proof of work (PoW) consensus protocols that underpin many of the most popular blockchains, including Ethereum and the Bitcoin mainnet, consume large amounts of energy, substantially more energy production will be necessary to sustain the growing Metaverse. For example, Intel estimated in December 2021 that our global computing infrastructure needs to be 1,000 times more powerful to sustain the Metaverse. And a recent study by the University of Cambridge concluded that if Bitcoin were a country, it would be in the top 30 energy users worldwide.^[1]

Corporate Responses to Blockchain Energy Uses

The energy demands of PoW blockchains have led many companies to consider how that energy is generated. For example, in 2021, Tesla suspended accepting vehicle purchases via Bitcoin because the company was “concerned about rapidly increasing use of fossil fuels for Bitcoin mining and transactions,” adding that it would resume its use of blockchain technologies when mining shifted to more renewable energy sources.

Some blockchain mining companies have made that shift to renewable energy, like Canadian-based

Bitfarms, which powers 100 percent of its operations by hydroelectricity. Similarly, Google has committed to operating on carbon-free energy in all of its data centers by 2030. Microsoft also intends to be “carbon negative” by 2030, and Amazon Web Services has a goal of powering its operations with 100 percent renewable energy by 2025. Institutional investors may also drive the shift to renewable energy use as their investment decisions, including in digital assets, have been shaped increasingly by the consideration of environmental, social, and governance (ESG) factors, including energy use.

Perhaps with this increased renewable energy demand in mind, the US Energy Information Agency expects 62 percent of all new US electric generation capacity in 2022 to come from solar and wind. Concurrent with the development of new renewable energy sources, other companies are working to develop less energy intensive blockchain technologies, including so-called proof of stake consensus protocols that do not use mining to validate transactions.

ENDNOTES

[1] Univ. of Cambridge Judge Bus. Sch., Comparisons, Cambridge Bitcoin Electricity Consumption Index, <https://ccaf.io/cbeci/index/comparisons> (last visited Apr. 21, 2022).

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