The Honorable Jeff Duncan
Chair
Energy and Commerce Subcommittee on Energy, Climate, & Grid Security
2229 Rayburn House Office Building
Washington, DC 20515

The Honorable Diana Degette
Ranking Member
Energy and Commerce Subcommittee on Energy, Climate, & Grid Security
2111 Rayburn House Office Building
Washington, D.C. 20515

September 28, 2023

Dear Chair Duncan and Ranking Member Degette,

The Digital Energy Council (DEC) appreciates the opportunity to submit this Statement for the Record to the Energy and Commerce Subcommittee on Energy, Climate, and Grid Stability hearing entitled, "Powering America's Economy, Security, and our Way of Life: Examining the State of Grid Reliability." These comments focus on the benefits of blockchains' Proof of Work (PoW) consensus mechanism and digital asset mining and how these innovations can support grid reliability and energy development.

About the Digital Energy Council

The Digital Energy Council is a non-profit advocacy organization whose members work at the forefront of energy security and modernization, strengthening grid resilience, and creating new, alternative energy channels to power communities. DEC is a leading authority for energy policy development. It is the voice for energy and digital asset mining industry leaders and a key resource for facilitating dialogue between industry, policymakers, and regulators around the bipartisan issues of digital asset mining, U.S. energy security, sustainability, and grid modernization. DEC also promotes best practices for industry data collection and dissemination.

At the Digital Energy Council, we support the development of energy via the Proof of Work consensus mechanism. The most prominent use case for digital asset mining and PoW is Bitcoin. The Digital Energy Council is digital asset agnostic and references to the Bitcoin blockchain and bitcoin are for illustrative purposes.[1]

About Proof of Work Consensus

Proof of Work refers to the method by which a blockchain is secured and verified - the confirmation of a set of transactions to be recorded permanently on the distributed ledger, via a consensus mechanism.

[1] Bitcoin (upper case) refers to the blockchain and bitcoin (lower case) refers to the digital asset, which is also denoted as BTC.

The term ‘work’ refers to the competition between digital asset miners to be the first to solve a complex cryptographical problem, or locate the ‘winning lottery ticket,’ achieved via proposing continuously different numeric keys in a function called ‘hashing.’ The winning miner is given the right to validate new transactions and add these to the blockchain in the form of a ‘block.’ In return for this work, they receive a predetermined amount of digital assets as a reward (referred to as a block reward).

There are two components to PoW mining rewards: (1) transaction fees paid by users that miners collect when verifying transactions on the ledger, and (2) new digital assets created with each new block to reward successful miners, according to a specified amount maintained by the network’s algorithm.

For example, most of a bitcoin miner’s revenue comes from the block reward of the newly minted bitcoin. After obtaining the block reward, miners can sell or dispose of bitcoin, often to exchanges. The reward for creating a new block is currently 6.25 BTC, although this decreases over time, with the block subsidy reward eventually falling to 3.125 BTC due to the halving event in 2024; this built-in method to continuously lower the amount of new supply is a deliberate limitation on inflation within the asset.

As a proven, robust way of maintaining a secure network, PoW supports open and decentralized systems, since anyone is able to participate in the activity via public, permissionless blockchains. Miners often work together in ‘pools’ to aggregate their total ‘hashrate,’ with greater computation power increasing the likelihood of successfully adding a block and receiving the reward. Mining pools split rewards proportionally amongst miners, according to contribution, with miners able to subsequently withdraw their share of the reward.

PoW is tied to the real world through operating costs, particularly energy and machinery costs. These in turn make PoW the most secure consensus mechanism, as the costs of attacking the network are overwhelming and prohibitive, and the difficulty of the cryptographical problem is adjusted periodically to respond to competition (e.g., the more miners competing, the higher the difficulty of the puzzle to ensure a consistent transaction time is kept). This ensures that security of the system is kept, even as computation power involved may vary in response to incentives (such as digital asset prices, or energy costs). Further, blockchains are designed so that each block in the blockchain is encrypted and transactions are conducted in a transparent manner as they are viewable and auditable via a block explorer.

Digital Asset Mining - A Tool for Grid Stability

Digital asset miners offer an important grid stabilizing tool, as they can quickly turn off, providing power to the grid at a moment’s notice, which takes stress off the grid during peak times also known as demand response or curtailment. The idea of demand response or curtailment is not new, as seen by a Department of Energy report from 2006, but it has not been available from a technology at this scale with such flexibility and precision as digital asset mining operations offer until now.

Quick Reaction Time

The flexibility digital asset mining offers is unprecedented. A mining location can be curtailed within minutes during times of peak periods. If there is a weather event, miners can prepare to curtail while still mining. If there is a last-minute emergency shutdown on short notice, miners or facilities participating in demand response can quickly divert power to where it is needed. As a global, decentralized network, the Proof of Work mechanism’s innate structure provides miners with flexibility, ensuring miners can help

divert power to critical infrastructure like hospitals.

Granularity and Efficiency

Digital asset miners have the unique ability to curtail machine by machine ultimately down to the kilowatt. This control over the power and hashrate of each miner allows digital asset miners to adjust to the precise detail and power needed. If there is a 2-megawatt facility, and the grid needs only 1 megawatt, miner operators can either shut down 1 MW of machines or underclock them all to 50% power. If some machines are less efficient, those machines can be cut first, leaving the most efficient ones running.

Load-Balancing Tool

Combining the low cost to react, quick reaction time, high availability, and an infinitely granular scale: digital asset mining serves as an extremely powerful grid balancing tool. The continual growth of hashrate means an increase in the breadth and depth of the market. The breadth is a further outward spread and saturation of hashrate worldwide that lends the opportunity for more curtailment. The depth means an increased wattage and capacity in digital asset mining data centers. As the grid incorporates more renewable sources of energy, technologies like demand response can help to accommodate these impacts and reduce the need for costly new transmission and distribution infrastructure. Digital asset mining can play a leading role in a broader transformation as the energy sector moves toward a mixture of renewables, distributed energy resources, and demand-side efforts which can strategically reduce consumption when used together.

This quickly growing industry creates a new way to supply power to the grid in times of stress. Digital asset mining's expanding industry and precise demand response tool opens the door to a more stable and cheaper power grid.

Demand Response Disrupts Peaker Plants

Currently, the U.S. relies on approximately 1,000 peaker plants, mostly fueled by natural gas[2], to meet infrequent peaks in electricity demand. Digital asset miners could potentially replace peaker plants and reduce the cost of on-demand electricity reserves. Instead of expensive peaker plants only turning on when demand is high, ancillary power plants are low-cost and available to supply power to the grid in times of need.

Consumer Benefits

Ultimately, a tool like digital asset mining drives down costs to consumers, ensuring they have a reliable, consistent supply of electricity during emergencies and letting them focus on costs that matter for them and their family. As stated in a Department of Energy report:

> Market-wide financial benefits are the lower wholesale market prices that result because demand response averts the need to use the most costly-to-run power plants during periods of otherwise high demand, driving production costs and prices down for all wholesale electricity purchasers.

[2] Energy Storage to Replace Peaker Plants, Sandia National Lab (Nov. 2020).

> Over the longer term, sustained demand response lowers aggregate system capacity requirements, allowing load-serving entities (utilities and other retail suppliers) to purchase or build less new capacity. Eventually these savings may be passed onto most retail customers as bill savings.[3]

Digital Asset Mining Supports Adoption of Renewable Energy Sources

Digital asset mining is not all the same. Most of the digital asset mining (over 50%[4]) is based on sustainable power - far more than the average industry - due to their proximity to energy plants. Renewable energy plants, such as hydropower plants, profit from selling digital asset miners energy from surplus energy that cannot be stored due to lack of storage capacity and would otherwise be wasted. This potentially leads to decreased costs for renewable energy use and increased incentive for energy companies to invest in renewable energy sources, strengthening the economic cases for improving electricity grids and expanding renewable energy sources in under-resourced areas.

Furthermore, regardless of energy source, mining does not directly emit any EPA criteria air pollutants or greenhouse gasses (GHG). From a Scope 1 emissions perspective, digital asset mining is fully electrified and emits zero-emissions.[5]

Two real world examples of how digital asset mining is supporting renewable energy infrastructure are by Digital Energy Council members, Cleanspark and Terawulf. Cleanspark invests in locations where there is excess clean power, particularly with distressed assets. Cleanspark then invests in these assets to re-purpose into zero-carbon data centers. Terawulf's facilities consume 91% zero-carbon energy, and their Lake Mariner facility is strategically located in Upstate New York where there is low cost, and often stranded, renewable resources, primarily hydro. Further, their Nautilus Cryptomine facility is the first behind the meter bitcoin mining facility in the United States that is directly connected to a nuclear power plant. Through a partnership with Talen Energy Corporation, the site is co-located with a 2.5 GW zero-carbon nuclear facility, the Susquehanna Steam Electric Station (SSES).[6]

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[3] Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them, Department of Energy (Feb. 2006).
[4] Bitcoin Mining Council 2023 First Half Data Collection, Bitcoin Mining Council (Aug. 9, 2023).
[5] *See* Scope 1 and Scope 2 Inventory Guidance, EPA (Aug. 21, 2023).
[6] Proof of Work and Enabling the Energy Transition, Crypto Council for Innovation (Sept. 2023).

Digital Asset Mining Supports Energy Infrastructure Development

Digital asset mining offers an incentive to build energy infrastructure to meet demand; and to do so in rural areas where grid connectivity is limited. By driving demand for power, digital asset mining allows companies to expand, and use benefits of scale to deliver low cost, renewable energy for consumers. KPMG recently called attention to how Bitcoin, "can be a useful ally in the transition to more renewable energy sources and reduce emissions."[7] Even where permitting is behind demand, mining offers a short-term solution to energy companies, allowing them to make a return on their investment before they are connected to the grid, ensuring that under-resourced areas are better served in the long-term.

Conclusion

The United States has an opportunity to lead in the development and deployment of digital asset mining and mining technology, but that opportunity is slipping away. Policymakers must act now to ensure that digital asset miners can continue to operate in the United States with sensible and certain regulation.

We appreciate the opportunity to submit this Statement for the Record and look forward to serving as a resource for these important and complex issue areas.

If you have any questions, please contact tom@digitalenergycouncil.org.

Very truly yours,

Tom Mapes

Founder and President

[7] Bitcoin's Role in the ESG Imperative, KPMG (2023).