In the News

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Crossing the Wires of Energy and Cryptocurrency Policy: U.S. Congress Investigates the Environmental Impact of Crypto Mining

By Jeffrey M. Kelly, Jeffrey E. Joseph

The rapid adoption of cryptocurrency and other popular blockchain applications has captured our global economy’s attention. Even as the value of cryptocurrencies slid from their all-time highs, the promise of these digital assets and the infrastructure being developed to support them has been transformative.

As with most emerging technologies, policymakers are still exploring the best approaches to regulating these new digital assets and business models. Questions about consumer protection, security, and the applicability of existing laws are to be expected; however, the environmental impact of these energy-intensive business practices has prompted considerable study and regulatory activity across the globe, including attention in the United States.

To understand the increasing energy demands associated with major cryptocurrencies – predominantly, Bitcoin and Ethereum – it is important to understand how many cryptocurrencies are generated in the first instance. Many countries, including China, have banned cryptocurrency mining, and, with the United States becoming the largest source of cryptocurrency mining activity, Congress began active investigations and hearings into the energy demands and environmental impacts in January 2022.

Proof of What? Why certain cryptocurrencies create high energy demands.
Not all cryptocurrencies – or blockchain platforms, for that matter – are created equal in their energy demands. The goal of most major cryptocurrency platforms is to create a decentralized, distributed ledger, meaning that there is no one authority to verify the authenticity of transactions and ensure that assets are not spent twice, for example. There needs to be a trustworthy mechanism – a consensus system – to verify new transactions, add those transactions to the blockchain, and to confirm the creation of new tokens. Bitcoin alone has well over 200,000 transactions per day,[1] so it should not come as a surprise that these platforms take an enormous amount of processing power to maintain.

There are currently two primary ways that network participants lend their processing power, which are framing part of the modern energy policy debates around cryptocurrency. The first form is “proof of work,” which is the original method that Bitcoin and Ethereum 1.0 employ. When a group of transactions (a block) needs to be verified, all of the “mining” computers race to solve a complex math puzzle, and whoever wins gets to add the block to the chain and is rewarded in coins. The competitive nature of proof of work consensus systems has led to substantial increases in computing power provided by institutional cryptocurrency mining operations and, with that, higher energy demands.

The second form is “proof of stake,” which newer platforms like Cardano and ETH2 use, promises to require considerably less energy to operate. With this method, validators “stake” their currency for a chance at verifying new transactions and updating the blockchain. This method rewards long-term investment in a particular blockchain, rather than raw computing power. A validator is picked based on how much currency they have staked and how long it has been staked for. Once the block is verified, other validators must review and accept the data before it’s added to the blockchain. Then, everyone who participated in validating the block is rewarded with coins.

While proof of stake consensus systems are becoming more common, the dominant – and most valuable – cryptocurrencies are still generated through energy-intensive proof of work systems.

Turning out the lights on Crypto: China bans domestic mining and other countries follow.

China has been incredibly influential in the modern cryptocurrency debate around energy use. For several years, China was the cryptocurrency mining capital of the world, providing an average of two-thirds of the world’s processing power dedicated to Bitcoin mining through early 2021.[2] In June 2021, however, China banned all domestic cryptocurrency mining operations, citing the environmental impacts of Bitcoin mining energy demands among its concerns.[3]

As Bitcoin miners fled China, many relocated to neighboring countries, such as Kazakhstan, and the United States became the largest source of mining activity – an estimated 35.1% of global mining power.[4] The surge in Bitcoin mining activity in Kazakhstan has not been without its controversy. Many Kazakhstan-based crypto mining operations are powered by coal plants, and there has been considerable unrest sparked by rising fuel costs.[5]

With some countries experiencing negative impacts from cryptocurrency mining operations, several countries have followed China’s lead in banning cryptocurrencies. According to a 2021 report prepared by the Law Library of Congress, at least eight other countries – Egypt, Iraq, Qatar, Oman, Morocco, Algeria, Tunisia, and Bangladesh – have banned cryptocurrencies.[6] Many other countries have impliedly banned cryptocurrency or cryptocurrency exchanges, as well.[7]

U.S. Congress shines its spotlight on the energy demands of cryptocurrency mining.

Now home to over a third of the global computing power dedicated to mining bitcoin, the United States has turned its attention to domestic miners and their impacts on the environment and local economies.
In June 2021, U.S. policymakers were still predominantly focused on the consumer protection and security concerns raised by digital currencies; however, Senator Elizabeth Warren alluded to her growing concerns about the environmental costs of, particularly, proof of work mining.[8] On December 2, 2021, Senator Warren sent a letter requesting information on the environmental footprint of New York-based Bitcoin miner Greenidge Generation.[9] The letter observed that, “[g]iven the extraordinarily high energy usage and carbon emissions associated with Bitcoin mining, mining operations at Greenidge and other plants raise concerns about their impacts on the global environment, on local ecosystems, and on consumer electricity costs.”[10] Senator Warren’s concerns sparked several rounds of congressional oversight and inquiries into the environmental impacts of, particularly, proof of work cryptocurrencies, over the past month.

Committee Hearing on “Cleaning up Cryptocurrency” begins oversight and investigation into the energy impacts of blockchains.

On January 20, 2022, the U.S. House of Representatives Committee on Energy and Commerce’s Subcommittee on Oversight and Investigations held a hearing, where the externalities of cryptocurrency mining were the focus of the agenda. An early indicator of the Subcommittee’s views on the issue, the title for the hearing was “Cleaning up Cryptocurrency: The Energy Impacts of Blockchains.”[11]

The hearing focused heavily on the amount of energy used to power proof of work cryptocurrency mining. Bitcoin Mining has been widely criticized for the massive amounts of power it consumes — globally, more than 204 terawatt-hours as of January 2022. Although some operations are attempting to utilize renewable energy, the machines executing these algorithms consume enormous amounts of energy primarily sourced from fossil fuels.

The five industry experts testifying before the House Energy and Commerce Oversight Subcommittee had competing views on how regulators should address the energy consumption of cryptocurrencies—with some experts opining that the computational demands were a “feature, not a bug.”[12] Two of the experts — Brian Brooks, CEO of Bitfury Group, and Professor Ari Juels, Faculty member at Cornell Tech — debated the technical merits between proof of work and proof of stake systems, described earlier in this article.[13] Similarly, Gregory Zerzan, an attorney with Jordan Ramis, P.C. who previously held senior positions in the United States Government, encouraged the Subcommittee not to lose sight of the fact that cryptocurrencies are but “one aspect of a larger innovation, blockchain.”[14] Although the viewpoints of the experts varied considerably, there was a clear consensus among the experts: energy-efficient alternatives should guide the path forward.

John Belizaire, the founder and CEO of Soluna Computing, said that cryptocurrency mining could further accelerate the transition to renewable energy sources from an energy perspective.[15] Renewables currently suffer from one significant deficiency — intermittency. An example of this challenge is the so-called “duck curve,” which illustrates major differences between the demands for electricity as compared to the amount of renewable energy sources available throughout the day. For example, when the sun is shining, there is significantly more power than consumers need for a few hours per day; however, solar energy does not provide nearly enough energy when demand spikes in the late afternoon and evening.[16] While there has been progress in the development of lithium battery storage — a critical piece in solving the issues mentioned above — for the time being, deploying these batteries at scale is still too expensive.

In addressing gaps in battery storage, Belizaire testified that “Computing is a better battery.”[17] Computing, he states, “is an immediately deployable solution that can allow renewables to scale to their full potential today.”[18] Belizaire highlighted that, unlike other industrial consumers, cryptocurrency miners can turn their systems off when necessary, giving miners the ability to absorb excess energy from a given area’s electrical grid rather than straining it. This ability to start and stop or pause computing processes can increase grid resilience by absorbing excess energy from renewable resources that provide more power than the grid can handle. Brooks shared similar hopes for how Bitcoin mining could help stabilize electric grids, support the viability of renewable energy projects, and drive innovation in computing and cooling technology.[19]
Steve Wright, the former general manager of the Chelan County Public Utility District in Washington, testified that "the portability of cryptocurrency operations could be a benefit in terms of locating operations based on underutilized transmission and distribution capacity availability."[20] Still, with ambitious goals to expand transmission and increase and integrate large amounts of carbon-free emitting generation, Wright testified that "substantial collaboration and coordination will be necessary to avoid cryptocurrency mining exacerbating an already very difficult problem."[21]

Congressional Democrats continue the investigation into domestic mining operations and the Cryptomining Industry response.

The January 20, 2022 Hearing made clear that policymakers are doing their due diligence into the impact that the United States could experience as the number of domestic cryptocurrency mining operations increase. Commentary from the Hearing forecasted that scrutinizing the sources and costs of energy used in cryptocurrency mining would be a priority for Democrat members of Congress.

To that end, on January 27, 2022, eight Democrat members of Congress led by Senator Elizabeth Warren “sent letters to six cryptomining companies raising concerns over their extraordinarily high energy uses.”[22] Citing the same concerns raised in her December 2021 letter to Greenridge, Senator Warren and her colleagues observed that “Bitcoin mining’s power consumption has more than tripled from 2019 to 2021, rivaling the energy consumption of Washington state, and of entire countries like Denmark, Chile, and Argentina.”[23] To assist Congress in its investigation, Riot Blockchain, Marathon Digital Holdings, Stronghold Digital Mining, Bitdeer, Bitfury Group, and Bit Digital were all asked for information related to their mining operations, energy consumption, possible impacts on the climate and local environments, and the impact of electricity costs for American consumers.[24] Senator Warren and her colleagues requested written responses by no later than February 10, 2022, so this increased oversight will likely continue.

Even with increased oversight, current trends in crypto mining and renewables could soon make such inquiries a moot point. Amid the heated debate over the environmental impact of cryptocurrencies, miners are increasingly committed to changing the negative reputation that it has built over the years – especially as these operations move to the United States. In November of last year, Houston-based tech company Lancium announced that it raised $150 million to build bitcoin mines across Texas that will run on renewable energy.[25] In 2022, the company plans to launch over 2,000 megawatts of capacity across its multiple sites.[26] Bitcoin mining company Argo Blockchain, a company listed on the London Stock Exchange, secured a $25 million loan to fund its “green” mining operation.[27] The 320-acre site will only use renewable energy, the majority being hydroelectric.[28] This deal is set to transform Argo’s mining capacity and is expected to be completed in the first half of 2022.[29]

Capital Markets also appear to have a growing appetite for the development of green crypto mining. In April of last year, Gryphon Digital Mining raised $14 Million Series A to launch a zero-carbon footprint Bitcoin mining operation powered exclusively by renewables.[30] In a raise that closed in just over two weeks, institutional investors – who were significantly oversubscribed – accounted for over thirty percent of the round.[31]

As congressional, social, and economic pressures grow, it is evident that there is going to be a big focus on the sustainability of Bitcoin mining. As such, we may very well see announcements, like the deals mentioned above, well into 2022 and beyond.


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[7] Id.


[10] Id. at p.2.


[18] Id.


[21] Id. p.9.


[23] Id.

[24] Id.


[26] Id.


[28] Id.

[29] Id.


[31] Id.

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