Submitted electronically via email to DigitalAssetsRFI@ostp.eop.gov

June 8, 2022

Stacy Murphy
Operations Manager
Office of Science and Technology Policy
725 17th Street NW
Washington DC. 20503

Re: RFI Response: Climate Implications of Digital Assets

Dear Ms. Murphy:

The Association for Digital Asset Markets ("ADAM") appreciates the opportunity to comment on the Office of Science and Technology Policy's ("OSTP") Request for Information (RFI) on the Energy Implications of Digital Assets. As discussed below, ADAM believes that the discussion surrounding the electricity usage of digital assets requires a thoughtful approach. As such, ADAM is encouraged by this RFI and looks forward to engaging with the White House to help position the United States as the global leader in financial technology in a responsible manner. Such an approach will require an innovative, forward-looking mindset to embrace new technologies and avoid leaving the United States at a long-term competitive disadvantage.[1]

ADAM believes that electricity consumption of digital asset blockchains should be taken within the appropriate context, weighing the benefits and security of these networks and understanding the role that both Proof of Work ("PoW") and Proof of Stake ("PoS") play in the digital asset ecosystem and how the growth trajectory and use cases of each validation mechanism may factor into the long-term development of this nascent technology. It is also important to factor in the benefits that digital assets have already provided to millions of Americans, including access to financial instruments, full trust transactions, and substantial wealth generation, as well as the potential for digital assets to reshape our financial system and many other industries.

Finally, it is ADAM's view that there is a leadership role that the U.S. can play to incentivize clean energy usage in blockchain mining. The recent growth in domestic PoW mining provides the United States with an opportunity to assume a position of global leadership to facilitate a transition of PoW mining toward cleaner energy sources and to leverage the unique demand incentives of blockchain mining operations to develop more renewable energy supply. Bitcoin

[1] For example, 5G technology is often cited as an example where the U.S. was left behind other jurisdictions because of governmental inaction. See, e.g.,https://www.cnbc.com/2022/02/17/us-well-behind-china-in-5g-race-ex-google-ceo-eric-schmidt-says.html

mining already uses a greater proportion of clean energy than most major countries' national grids, but responsible industry participants, including ADAM members, understand that continued progress will be necessary in order for the digital asset industry to remain sustainable as it scales. Doing so will aid in the transition toward less carbon-intensive sources of electricity which mining activities have the potential to facilitate, and indeed are already doing so through helping fossil fuel companies reduce emissions through a process known as flare mitigation and through the ability to provide a source of countercyclical demand on an energy grid.

About ADAM

ADAM is a private, non-profit, membership-based association of firms operating in the digital asset markets and is a standards-setting body and self-governing association committed to promoting market integrity and best practices. ADAM works with leading financial firms, entrepreneurs, and regulators to develop industry best practices that facilitate fair and orderly digital asset markets. In this vein, ADAM's objectives are to: (1) protect market participants from fraud and manipulation; (2) provide clear standards for efficient trading, custody, and the clearing and settlement of digital assets; (3) encourage professionalism and ethical conduct by market participants; and (4) increase transparency and provide information to the public and governments about digital asset markets. In furtherance of this, ADAM released a principles-based Code of Conduct (Code)[2] in late 2019 that sets certain standards of professional conduct for ADAM members. In particular, the Code addresses the following areas:

- Compliance and Risk Management
- Market Ethics
- Conflicts of Interest
- Transparency and Fairness
- Market Integrity
- Custody
- Information Security and Business Continuity
- Anti-Money Laundering and Countering the Finance of Terrorism

Every ADAM member agrees to adhere to the Code. The goal is to bring professional standards into the nascent but rapidly-growing digital asset markets, and to develop trust in those markets so that they can flourish.

Our members are at the cutting edge of innovation through the use of new technologies, such as blockchain. However, they recognize that proper regulation and conduct are essential to their businesses and to the development of a sustainable marketplace and public trust. They believe that a diverse financial ecosystem is a source of strength, and they aim to use their technology to

[2] The Code is available at http://www.theadam.io/code/.

find new ways of reaching consumers and work within the current financial system to improve efficiencies.

ADAM and its members are committed to working with lawmakers and regulators to promote responsible innovation in the digital asset space in a manner that expands the availability of financial services. We support clear regulatory requirements to facilitate full compliance by our members.

Overview Of Comments

ADAM's comments in this letter will focus on providing OSTP with (1) an overview of the digital asset ecosystem, (2) a discussion of the economics of digital asset validation, (3) an analysis of proof of work mining's impact on the renewable energy transition and carbon reduction, and (4) a discussion of industry commitments & economic outlook

In addition to these comments provided below, ADAM and its members are always available to provide additional information and insights to the OSTP and its staff regarding the operation of the digital asset marketplace.

Overview of the Digital Asset Ecosystem

The digital asset ecosystem is made up of a wide range of stakeholders, including miners and other nodes that provide computing resources for recording and verifying a digital ledger, developers that launch distributed applications (dApps), users that range from hobbyists to institutional investors, and off-chain service providers that provide reporting and monitoring services, and cross-chain communications. Digital asset platforms benefit from a number of technical advancements ranging from transparent market information to unique transaction methods, which allows many new types of transactions to occur and economic value benefits to be created and shared in new ways.

The digital asset industry aims to leverage blockchain and other digital asset technology to provide digital stores of value, as well as saving vehicles, lending, liquidity, and asset transfer services for digital asset users. The added transparency provided by on-chain transactions and open participation is attractive to many users seeking to transact in a decentralized manner.

These services have provided millions of Americans access to financial instruments, full trust transactions, and substantial wealth generation. Recent studies[3] have indicated that 15-20% of Americans own or are interested in having exposure to digital assets, with Bitcoin being one of the most desired digital assets. A young and diverse consumer interest in digital assets (especially in Bitcoin) provides a unique opportunity, which, if seized, can reshape the U.S.

[3] Pew Research, 16% of Americans say they have ever invested in, traded, or used cryptocurrency, available at: https://www.pewresearch.org/fact-tank/2021/11/11/16-of-americans-say-they-have-ever-invested-in-traded-or-used-cryptocurrency/. Additionally, Bitcoin users skew younger and Asian, Black and Hispanic adults are more likely than White adults to say they have ever invested in, traded, or used a digital asset. Id.

financial system, lead to more Americans gaining financial literacy, being brought into the financial services umbrella, and making prudent investment decisions.

The participants and infrastructure that make up digital asset markets vary widely, and ADAM finds it useful to use the following definitions of key ecosystem terms:

- "**Digital Asset**" (i) a cryptographically-derived digital instrument available on a public, private or permissioned blockchain or other form of distributed ledger, including without limitation instruments that represent, or facilitate the exchange of or access to, any digital or real-world asset, or any set of rights, protocols, or rules; or (ii) any option, futures contract, swap or other instrument or index, the value of which is derived wholly or principally from the value of underlying instruments meeting the description in clause (i). Digital Assets may be categorized in many different ways, and may be subject to varying legal and regulatory regimes depending on their features or the manner in which they are issued or exchanged. This definition is intended to be construed broadly to include all instruments generally meeting the descriptions in clauses (i) and (ii) above.

- "**Proof of Work**" PoW is the mechanism that allows the decentralized blockchain networks to come to consensus or agree on elements of a digital asset transaction, like account balances and the order of transactions. This prevents users from "double spending" their coins and ensures that the blockchain is tremendously difficult to attack or manipulate. PoW is the underlying algorithm that sets the difficulty and rules for the work miners do.[4]

- "**Mining**" Mining is the "work" itself. It's the act of adding valid blocks to the chain. This is important because the chain's length helps the network follow the correct blockchain chain and understand blockchain's current state. The more "work" done, the longer the chain and the higher the block number, the more certain the network can be of the current state of things. Validation involves solving a complex mathematical problem that is difficult to solve but easy to verify.[5][6]

- "**Miners**" Miners are the users validating the blockchain transaction on the distributed ledger. Miners that successfully solve the mathematical problem receive a reward from the network. For all major PoW blockchains, this reward is the native cryptocurrency.

- **"Bitcoin Miners"** Bitcoin Miners build and maintain the public ledger, thus recording every past, present, and future Bitcoin transaction. Sending and receiving Bitcoin, for example, are considered transactions which are validated and settled by a miner.

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[4] Ethereum Foundation: Poof of Work

, https://ethereum.org/en/developers/docs/consensus-mechanisms/pow/.

[5] ibid.

[6]Techopedia: Cryptomining
https://www.techopedia.com/definition/33729/cryptomining

Bitcoin Mining is a race in which all miners compete against each other to win the block. While typically referred to as solving a math problem, a more accurate comparison would be completing a puzzle.

Bitcoin Miners have three main roles in the network: (1) confirming transactions; (2) securing the blockchain; and (3) participating in the fair distribution of new Bitcoin. Bitcoin Miners build the blockchain by publishing new blocks of transactions, which are secured by hashing (the work done by miners). They are in turn rewarded for by the network in Bitcoin.

Individual nodes are tasked with verifying that the protocol rules are adhered to at any point in time, and propagating transactions across the network to reach miners -- thus confirming no new transactions are fraudulent against the network's rules. Nodes also ensure the distribution and decentralization of Bitcoin by storing the entire history of the network (the Bitcoin blockchain). Nodes are distributed all around the world, and protect the information contained in blocks from being altered or deleted.

- **"Hashrate"** Hashrate is a measure of the computational power per second used when mining. More simply, it is the speed of mining. It is measured in units of hash/second, meaning how many calculations per second can be performed. Machines with a high hash power are highly efficient and can process a lot of data in a single second.[7]

- **"Cryptologic Block"** Blocks are data structures within the blockchain database, where transaction data in a cryptocurrency blockchain are permanently recorded. A block records some or all of the most recent transactions not yet validated by the network. Once the data are validated, the block is closed.[8]

- "**Proof of Stake**" PoS is a type of consensus mechanism used by blockchains to achieve distributed consensus. In PoS, validators explicitly stake capital in the form of Ether into a smart contract on the blockchain. This staked Ether then acts as collateral that can be destroyed if the validator behaves dishonestly or without care. The validator is then responsible for checking that new blocks propagated over the network are valid and occasionally creating and propagating new blocks themselves.[9]

- **"Layer 2 Protocol"** A layer 2 protocol is a system built on top of an existing blockchain. The protocol can serve multiple purposes, but most often the layer 2 protocol seeks to lower cost, increase speed, and allow scaling for the base blockchain.

- **"dApps" or "Smart Contracts"** dApps are autonomous code that function like computer programs shared across the applicable distributed ledger, which can track, process, receive

[7] bitFlyer Hashrate: https://bitflyer.com/en-us/s/glossary/hashrate
[8] Investopedia: Block (Bitcoin Block)
https://www.investopedia.com/terms/b/block-bitcoin-block.asp#:~:text=Blocks%20are%20data%20structures%20within,validated%2C%20the%20block%20is%20closed.
[9] Ethereum Foundation: Poof of Stake
https://ethereum.org/en/developers/docs/consensus-mechanisms/pos/

and send network transactions that may (but are not required to) relate to digital assets interoperable with the Decentralized Finance ("DeFi") platform.

- **"DAOs" or "Decentralized Autonomous Organizations"** DAOs are a special kind of smart contract platform that allows users to control certain aspects of the administration of funds under management by the DAO. For example, in the context of a DeFi platform, a DAO may control features offered on the DeFi platform or the migration of the DeFi platform to a new set of contracts.

- **"Governance Tokens"** Governance tokens are issued by smart contracts that allow holders to vote on DAO administration. In addition to voting rights, these tokens may be resold for other digital assets or may have certain powers in respect of the DAO.

- **"Stablecoins**" Stablecoins are tokens issued with the aim of maintaining a 1:1 exchange rate (or an approximation thereof) with another asset, such as USD. USDP and USDC are all examples of stablecoins.

- **"Oracles"** Oracles are reporting services that link information from within or without a blockchain to dApps and smart contracts on the blockchain. Frequently, oracles will report the prices for digital assets, either curated internally or from centralized exchanges.

- **"AMM" or "Automated Market Makers"** AMM are algorithms within smart contracts that provide pricing for buying and selling digital assets managed by the DeFi platform. AMMs may rely on Oracles or may have internal pricing models that may be reactive to arbitrage.

- **"Wrapped" tokens or coins** Wrapping refers to receiving one digital asset and reissuing it at a 1:1 basis as another "wrapped" form. The wrapped form is typically more compatible with user wallets and widely available smart contracts. For example, ETH, the native unit on the Ethereum blockchain, is expensive to transact in. wETH is issued by an ERC-20 type smart contract that trades 1:1 with actual ETH and can be traded more easily. wBTC is "wrapped bitcoin" issued by a smart contract on the Ethereum Blockchain when a user sends native BTC to a particular contract on the bitcoin blockchain.

- **"Guardians"** Guardians are monitoring programs, like Oracles, that monitor transactions across different blockchains.

- **"Staking"** Staking is a reward or opportunity to pool resources to provide staking services that blockchains or certain DeFi projects may offer. For example, a blockchain utilizing proof of stake validation lets users participate in verifying the blockchain by staking the native token, providing a reward if they propose and approve valid smart contracts. Users may pool their tokens for shared staking rewards.

- **"Nodes"** Nodes typically refer to a computer resource involved in validating transactions or providing information, such as pricing information, to the blockchain (like an Oracle). More generally, nodes also refer to an instance of operating software to interacting with a blockchain, whether as a validator, application or end user.

- **"Project Administrators"** Project administrators are provided with limited administrative powers by several DeFi projects to certain trusted individuals, such as the ability to freeze all trading and liquidate assets under management. For some DeFi projects, there are no Project Administrators or the powers granted to those Project Administrators are significantly restricted.

- **"Liquidity Providers**" Liquidity providers of digital assets for use by a smart contract. Typically, they are compensated via the fees charged by the smart contract or in governance tokens.

Using these and other tools, digital asset innovators have created a variety of projects with immense potential. Innovation in this area is proceeding rapidly and globally, with the precise contours of this technology impossible to determine at this time.

Economics of Digital Asset Validation

When considering the difference between PoW and PoS blockchain validation, it is helpful to consider the economic incentives that cause users to support and validate various blockchains.

The unique feature of the leading PoW blockchains is that they are not owned or controlled by a single entity, yet they enable full trust transactions without a centralized entity between either transacting party by using electricity for network security in the form of hacking and falsification prevention. On PoW blockchains, such as Bitcoin, miners compete with other miners to solve the cryptologic block most effectively. Any person with an internet connection and computation capability is eligible to attempt to solve the cryptologic block and to earn the digital asset reward for successfully validating the network. It is important to note three key considerations surrounding the process:

1. Due to the global and decentralized incentives, and with leading PoW digital assets at their current price and demand levels, there are substantial cross-border economic incentives to mine PoW digital assets.
2. As a result, much like traditional global commons products, miners of digital assets are constrained by their cost inputs. Therefore, computing power and electricity input costs factor into miners' profitability, and miners are incentivized to seek out the cheapest electricity sources and most efficient computing processes.
3. Mining equipment is transportable, and mining can be performed anywhere with access to the internet and a power source.

From the aforementioned three incentives, ADAM believes that so long as the price of tokens on leading PoW blockchains remains high, there will always be economic incentives internationally to mine digital assets and secure their economic profits. Mining activity represents real economic value, and, in addition to individuals across the globe, many countries have taken steps to facilitate and harness those activities, often viewing them as part of broader nation-state competition efforts. Some countries with crypto-miners have access to clean electricity, such as

hydropower; other nations generate power in more carbon-intensive ways, such as through coal power.

A strong example of the three incentives is Bitcoin mining in China prior to 2021. Mining metrics showed seasonal shifts of mining in capacity across China. During a decent portion of the year, most Bitcoin mining was concentrated in NW China, where hydropower was cheap and abundant. However, during the dry season, economic incentives led to a large migratory pattern, where mining power would shift South and rely on hydrocarbon fuel sources.[10]

When China cracked down on Bitcoin mining in 2021, which ADAM chiefly views as nation-state control and suppression of dissent, the mining capacity from China sifted to other jurisdictions. Social media videos showed miners quickly packing up their equipment into container cargos to be sent to a host of new destinations.[11] As a result, counties such as Kazakhstan and Georgia became destinations for mining capacity leaving China. Notably, Kazakhstan's electric grid relies primarily on coal, while Georgia has significant hydropower reserves. [12] [13] The difference in power sources from these two nations demonstrates the disparate carbon impact that PoW mining can have depending on the local electricity sources.

The ban on digital asset trading and mining in China has also driven mining activity to the U.S., where the U.S. was already gaining market share. Additionally, mining capacity has shifted to public companies providing new transparency to the space. All this activity in the U.S. has generated a range of jobs, ranging from construction workers, security guards, electricians, technicians, network architects, software engineers, and hardware engineers. Further, these jobs are concentrated near electricity sources, which have allowed the creation of jobs in economically underserved areas, including rural, de-industrialized areas.

ADAM believes that serious economic incentives exist for the U.S. to continue to promote sustainable PoW mining domestically to harness the economic incentives, promote widespread growth in underdeveloped areas, and ensure that mining is completed using sustainable power. Doing so will provide more transparency around the source and power of leading PoW chains and will ensure U.S leadership and economic competitiveness in this growing economic sector and ensure that greener mining practices are undertaken. Finally, the future of PoW mining is deeply intertwined with that of the electric sector, and mining has the potential to dramatically improve the robustness and cleanliness of the electric grid, something that ADAM will expand on in the next section.

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[10] Chinese Government Crackdowns and Cheap Hydropower- Miners Migrate from North to South China- Bitcoin.com

[11] China has triggered a bitcoin mining exodus
https://www.wired.co.uk/article/china-bitcoin-mining-ban-kazakhstan

[12] China Banished Cryptocurrencies. Now, 'Mining' Is Even Dirtier. NYT
https://www.nytimes.com/2022/02/25/climate/bitcoin-china-energy-pollution.html

[13] A hydro-powered Bitcoin boom in Georgia. BBC: https://www.bbc.co.uk/sounds/play/w3csy741

ADAM believes the relative electricity consumption of PoW and PoS blockchains should be assessed within the appropriate context, weighing the benefits and security of these networks and understanding the role that PoW and PoS validation play in the digital asset ecosystem and how the growth trajectory and potential uses cases of each validation mechanism will factor into the broader industry trajectory. PoW validation has been well documented for its ability to facilitate secure decentralized consensus while preventing misuse and abuse of the network. Many of the newer digital asset blockchains leverage PoS validation, which is far less electric-intensive than PoW. As a result, transactional activity on PoS networks is growing relative to PoW networks due to PoS networks' ability to process larger transaction volumes in a shorter period and at a lower cost. At the same time, innovations have also occurred on PoW blockchains, where Layer 2 payment protocols have been built on top of the PoW blockchains. These Layer 2 protocols allow for more transactions to be completed without the need for every transaction to be finalized on the blockchain. ADAM believes these PoS networks and less electric-intensive layer-2 protocols will become increasingly important over time, which will continue to minimize the overall climate impact of blockchains.

Finally, ADAM believes that it is important to take a comparative view when considering the electricity usage of various blockchain networks when compared to other industries. Bitcoin and Ether, for example, in the commodity space, electricity consumption is small compared to other commodities, such as mined commodities, livestock, and agricultural products. Additionally, many of the firms and individuals in the digital asset sector have no factories or production facilities, rely on remote work, and employ smaller workforces, which further limits the carbon impact of the industry.

Proof of Work, the Renewable Energy Transition, and Carbon Reduction

The expansion of domestic PoW mining provides the U.S. with an enormous opportunity to facilitate a transition toward less carbon-intensive energy usage by PoW miners. More broadly, PoW mining also has the potential to expand the adoption of wind and solar energy domestically, as well as help to help fossil fuel companies reduce emissions from flaring. The growth of PoW mining has led to a diverse ecosystem of different participants operating a variety of business models, including proprietary miners, chip manufacturers, and financial service providers. Miners have begun to specialize and integrate with adjacent industries, particularly the energy industry, where they can provide baseload for transitioning thermal generators and demand-response services crucial to the renewable energy transition.

Many renewable electricity sources, including wind and solar power, suffer from intermittency and low-capacity factors inherent in their production: solar, for example, cannot generate electricity at night. While these issues can theoretically be bridged with batteries, today's batteries are expensive and the production of lithium, nickel cadmium, and other raw materials used in their manufacturing have catastrophic downstream environmental effects. Mining offers an economical, relatively low-waste solution to this problem that can help renewable electricity producers compete with fossil fuel-based generators, while utilities scale electricity storage systems and technologies develop to become economically feasible options.

Mining also incentivizes and accelerates a transition to renewable electricity generation sources with PoW mining operations acting as prime consumers of excess electricity production: when wind turbines and solar arrays are generating at nameplate and there is more electricity being produced than there is demand on the grid, miners can turn on and start drawing load at a moment's notice, helping to stabilize the grid frequency around its target of 60 Hz,[14] while facilitating the purchase of otherwise stranded electricity from renewable generators.

Additionally, as power generation and available capacity becomes constrained due to various reasons (see ERCOT's winter storm in Feb. 2021)[15] and demand on the grid remains higher than the available supply of electricity, miners can turn off, variably shedding their electrical load to send that electricity back to the grid and prevent rolling brownouts and blackouts. In this way, PoW miners operate as the inverse of a natural gas peaker plant to stabilize the grid around its target frequency by relinquishing existing electricity being used instead of ramping-up thermal generation facilities. This immediate response to frequency deviation events allows PoW miners to be the most flexible, sophisticated participants in the energy markets—and a welcomed new participant for an aging electrical grid that is constantly balancing electrical supply/demand with transmission constraints amidst a transition to non-dispatchable, renewable generation sources. As Brad Jones, ERCOT's Interim CEO, recently stated—regarding grid, "[i]t's a great opportunity for us. The more demand, to the degree that it is flexible, that it can turn down whenever we need the power for other customers, is fantastic…We can use that cryptocurrency to soak up the excess generation when there's a lot of that—and provide a home for more wind and solar to come to our state. And, at the same time, it reduces their consumption during periods where we get tight and need power for other customers."[16]

PoW mining can also help fossil fuel companies reduce emissions through a process known as flare mitigation, which generates electricity from associated gas that would otherwise be vented (let out into the atmosphere) or flared (combusted) on-site.

In the oil production process, associated gas is produced with crude at the wellhead. This associated gas is a variable mixture of methane, propane, ethane, and other volatile organic compounds (the exact gas composition is dependent upon the downhole formation and other factors). There are plenty of commercial and industrial uses for this gas, but methane makes up most associated gas composition—and although functional for thermal generation, it cannot be economically transported without gathering systems, compressor stations, and gas pipelines. As such, oil producers routinely flare associated gas where it is not economically feasible to construct gas takeaway infrastructure. Unfortunately, the global warming potential of vented, or uncombusted, methane is roughly 25 times as environmentally damaging as those of an equivalent quantity of CO2.[17] Flaring burns the methane and produces CO2 as a byproduct,

[14] Jordan Wirfs-Brock and Leigh Paterson, IE Questions: What Keeps Our Electric Grid Humming? (July 10, 2015), http://insideenergy.org/2015/07/10/ie-questions-what-keeps-our-electric-grid-humming/.
[15] The Timeline and Events of the February 2021 Texas Electric Grid Blackouts, https://energy.utexas.edu/ercot-blackout-2021.
[16] *See* ERCOT Interim CEO, Brad Jones, *interview with CNBC* (March 18, 2022) https://www.youtube.com/watch?v=gKnRfDeFgr0.
[17] U.S. Environmental Protection Agency, Importance of Methane, https://www.epa.gov/gmi/importance-methane.

theoretically reducing the CO2 equivalents by 24x.[18] Ideally, the DRE or destruction and removal efficiency of a producer's flare stack is in the high 90% range, but that DRE varies from producer-to-producer depending upon flare type (non-assisted, pressure assisted, enclosed-ground, etc.), maintenance schedule (or lack thereof), and weather effects (high-wind conditions can degrade flare DRE).

PoW mining offers a solution. Instead of flaring or venting gas, companies like Great American Mining, Upstream Data, and Crusoe Energy Systems are building infrastructure to capture this methane at the wellhead and use the otherwise-wasted gas to mine Bitcoin and other PoW digital assets.

Unlike flaring, generators and turbines offer a controlled environment for combustion, optionality for additional emissions control systems to further decrease emissions, and an additional benefit in the form of recapturing wasted gas for electricity generation to the tune of >99% combustion efficiency. This means that oil producers can ensure a 24x reduction in emissions compared to venting/flaring associated gas into the atmosphere. The IEA estimates that the oil and gas sector emitted 82 Mt (around 2.5 GtCO2-eq) in 2019.[19] For context, this corresponds to roughly 8% of the 33.2 Gt of the global energy-related CO2 emissions that year.

Industry Commitments & Economic Outlook

The digital asset industry is a forward-looking industry that represents a new way of doing business and new outlooks on traditional models. Accordingly, it is one of the fastest-growing sectors of the U.S. economy. As the industry grows, it is important to understand its carbon footprint, manage it, and increase the use of clean electricity to ensure the industry remains sustainable as it scales. In line with this, a number of ADAM members have made pledges to carbon neutrality in their engagement.

Presently, estimating the costs of electricity consumption and carbon output associated with blockchain mining is difficult because mining is decentralized, and discerning how much electricity is coming from which source is elusive. Nonetheless, efforts from the mining industry and market participants to become more transparent led to the acceleration of an ongoing trend toward transparency and openness in the industry. Long considered one of the more opaque and hard-to-navigate verticals in the cryptocurrency space, mining has become more accessible and easier to understand through the efforts of a diverse set of public market participants, researchers, working groups, and service providers.

With more mining companies now listed on capital market exchanges, the requirement of these companies to provide greater investor transparency into their operations has opened the doors for the industry to be able to gain key insights. One of the biggest benefits of having many miners

[18] U.S. Department of Energy, Office of Oil and Natural Gas & Office of Fossil Energy, Natural Gas Flaring and Venting: State and Federal Regulatory Overview, Trends, and Impacts (June 2019), at 6, https://www.energy.gov/sites/prod/files/2019/08/f65/Natural%20Gas%20Flaring%20and%20Venting%20Report.pdf.

[19] Tracking Methane Emissions from Oil and Gas 2020 (June 2020), https://www.iea.org/reports/tracking-methane-emissions-from-oil-and-gas-2020.

publicly listed is that the industry can get better insight into hashrate growth based on the releases of companies' machine purchase orders. This not only provides insight into companies' growth plans, but also provides insight into how much capital is being invested in hardware and at what price, and how much additional capital companies may need to raise to finance the purchase.

At the end of Q4 2021, publicly traded miners represented approximately 18% of the Bitcoin network's hashrate.[20] By the end of 2022, public miners are expected to represent 40-45% of the Bitcoin network's hashrate, based on the 100+ Exahash of machines on order for 2022. This means that nearly half of the network's electricity consumption will be easily auditable and held to the standards of the US public equities markets.

In parallel with market-driven reporting, self-reporting organizations, such as the Bitcoin Mining Council (BMC), have begun to share information on constituent miners' electricity mix and electricity consumption. On an entirely voluntary basis, 29 firms representing 46% of the network's hashrate have reported environmental data on their operations for the last two consecutive quarters. Many miners have heard the concerns raised by regulators and communities around electricity consumption and are committed to increased transparency. The BMC data shows that participating miners rely on a greener electricity mix than most major countries' national grids and estimates that the same is true for miners across the network. In Q4 2021, BMC members' average Bitcoin mining sustainable electricity mix[21] was 66.1% and the global Bitcoin mining network was estimated to be 58.5%.[22]

The above is the current trajectory of the industry. ADAM is encouraged by the path but also believes there is more work to be done. In accordance, there is a direct role that the federal government can play to incentive the continued trajectory of the industry.

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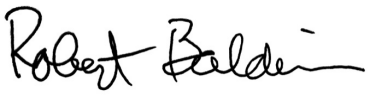
[20] 2021: Bitcoin Mining's Big Year, Galaxy Digital Research, https://www.galaxydigital.io/post/2021-bitcoin-minings-big-year/.

[21] The BMC defined sustainable energy as electricity generated by hydro, wind, solar, nuclear, and geothermal. The definition does not take into account renewable energy credits (RECs).

[22] *See,* https://bitcoinminingcouncil.com/q4-bitcoin-mining-council-survey-confirms-sustainable-power-mix-and-technological-efficiency/.

ADAM appreciates the OSTP's consideration of the comments above. ADAM stands ready to answer any questions you may have, and we look forward to continued collaboration with OSTP.

Respectfully,



Robert Baldwin

Head of Policy

Association for Digital Asset Markets (ADAM)