

October 7, 2022

BY E-MAIL AND ELECTRONIC SUBMISSION

Mr. Christopher Kirkpatrick, Secretary
Commodity Futures Trading Commission
Three Lafayette Center
1155 21 Street NW
Washington, DC 20581

Re: Comments in Response to the Commission's Request for Information on Climate-Related Financial Risk

Dear Commissioners:

We greatly appreciate this opportunity to comment on the Request for Information on Climate-Related Financial Risk issued by the Commission on June 8, 2022. The Commission's thoughtful approach, seeking detailed and comprehensive information before taking action, is commendable. We likewise applaud the Commission for its commitment to soliciting information from the public through a transparent process. And we are particularly grateful that the Commission extended the submission deadline so that commenters could address its questions as fully as possible.

At a16z, we believe that blockchain technology is only at the beginning of its development, and that it has incredible potential to promote innovation, entrepreneurship, and economic growth. Like the Commission, we are also deeply committed to addressing climate change and working toward a future of net-zero carbon emissions. Our investments reflect this commitment. Earlier this year, for instance, we led a \$70 million fundraising round for Flowcarbon, a company that aims to allow firms to trade carbon offsets as blockchain tokens,¹ and we previously invested in Celo, the first carbon-negative blockchain.² We hope that our observations, drawn from our

¹ Arianna Simpson, *Investing in Flowcarbon*, Andreessen Horowitz (May 24, 2022), <https://a16z.com/2022/05/24/investing-in-flowcarbon/>.

² Katie Haun & Denis Nazarov, *Celo*, Andreessen Horowitz (Apr. 2, 2019), <https://a16z.com/2019/04/02/celo/>.

experience in promoting both digital assets and sustainability, can be of assistance to the Commission in accomplishing its aims.

In short, while the need for regulatory intervention may arise as blockchain technology matures and experience with it grows, there is considerable value in staying any regulatory interventions now, since they could unintentionally disrupt positive developments in web3 and quickly become outdated given the speed of innovation. As we explain below, privately directed innovations have already made it possible to run an efficient blockchain with drastically lower environmental costs than when the technology first emerged. Innovations have also identified ways to leverage blockchain technology to help reduce carbon emissions across industries, including by enhancing both Environmental, Social, and Governance (ESG) reporting and the integrity of markets for carbon offsets. And blockchain technology has become a significant source of high-quality, high-paying American jobs, and is critical to maintaining this country's competitive edge and leadership in the global economy, as well as strengthening our national security. Given the significance and pace of these developments, we believe the best course of action now is to allow blockchain technology to develop organically unless and until the need for regulation becomes clear.

I. About a16z

Andreessen Horowitz, also referred to as a16z, is a venture capital firm that backs entrepreneurs building the future through technology. We invest in seed, venture, and late-stage technology companies, focused on bio/healthcare, consumer, crypto, enterprise, fintech, and games. The firm currently has \$35 billion in committed capital under management across multiple funds.

a16z aims to connect entrepreneurs, investors, executives, engineers, academics, industry experts, and others in the technology ecosystem. We have built a network of experts, including technical and executive talent, top media and marketing resources, Fortune 500/Global 2000 companies, as well as other technology decision makers, influencers, and key opinion leaders. a16z uses this network as part of our commitment to helping our portfolio companies grow their businesses.

At a16z, we believe we need an internet that can help the United States retain leadership in a world of increasing competition, unlock opportunity for the millions on the margins of the

innovation economy, and enable people to take control of their digital information. The solution is web3—the third generation of the internet—a group of technologies that encompasses digital assets, decentralized applications and finance, blockchains, tokens, and decentralized autonomous organizations. Together, these tools enable new forms of human collaboration. They can break through the stalemates that define too many aspects of public life and help communities make better collective decisions about critical issues, such as how networks will evolve and how economic benefits will be distributed. We are radically optimistic about the potential of web3 to restore trust in institutions and expand access to opportunity.

II. The Environmental Costs of Blockchain Technology Have Declined Dramatically

Blockchain technology was first developed in 2008, less than a decade and a half ago. When blockchain technology first emerged, new blocks were created and added to an existing blockchain through a process known as Proof of Work.³ Under a Proof of Work methodology, the first network participant to solve an extraordinarily difficult mathematical problem is entitled to add the information that will compose the next block and to receive as compensation some amount of the network’s cryptocurrency, such as bitcoin. The computing power required to solve these problems is considerable, leading to substantial energy use.⁴ But, as with other technologies, innovations have since emerged to reduce energy consumption in the creation of new blocks. One innovation is the emergence of Proof of Stake, which is effectively a lottery for the right to add the next block.⁵ Users enter the lottery by staking⁶ a certain quantity of cryptocurrency, with those staking a greater quantity enjoying a correspondingly greater chance of selection. With far fewer complicated calculations involved, Proof of Stake requires much less computational power and thus less energy use.

A recent event, known as “the Merge,” illustrates the environmental impact of Proof of Stake. On September 15, 2022, Ethereum, the second-largest blockchain, converted its block-creation process from a Proof of Work to a Proof of Stake methodology. As a result, its energy

³ See, e.g., *Proof-of-Work*, Ethereum (Sept. 26, 2022), <https://ethereum.org/en/developers/docs/consensus-mechanisms/pow/>.

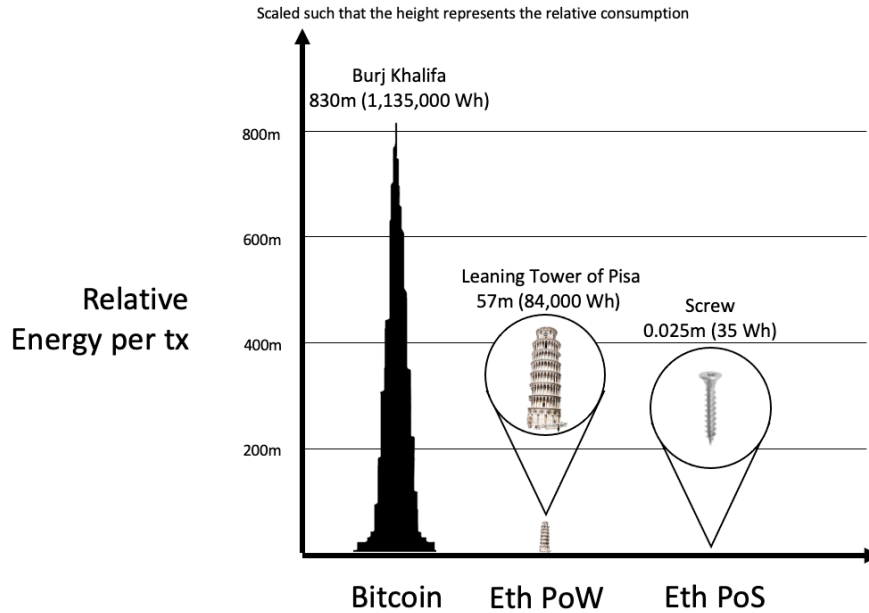
⁴ For more information regarding “staking” digital assets, see *Staking with Ethereum*, Ethereum (Sept. 15, 2022), <https://ethereum.org/en/staking/>.

⁵ See, e.g., *Proof-of-Stake*, Ethereum (Sept. 26, 2022), <https://ethereum.org/en/developers/docs/consensus-mechanisms/pos/>.

⁶ *Id.*

consumption decreased by nearly 99.95%.⁷ In practical terms, this reduction is equivalent to the difference between the total energy requirements of Finland and the total energy requirements of a small town of 2,100 homes.⁸

Relative energy consumption per transaction



9

At the same time, the Merge has also provided benefits beyond a reduced carbon footprint. More users can now participate in the creation of new blocks, because expensive high-level

⁷ Carl Beekhuizen, *Ethereum's Energy Usage Will Soon Decrease by ~99.95%*, Ethereum (May 18, 2021), <https://blog.ethereum.org/2021/05/18/country-power-no-more>. Using available estimates, with Proof of Stake, Ethereum will use .01 TWh (Terawatt-Hour) annually with 395 million transactions (trailing 12-month transaction data), and each transaction will consume approximately .0253 kWh (Kilowatt-Hour) or 25 Wh (Watt-Hour). For comparison, a Google search uses roughly 3-4 Wh, and an average American household consumes between 25,000-100,000 Wh in one day. At .852 pounds of CO₂ per kWh, 1 Ethereum transaction will generate roughly .02 lbs of CO₂.

⁸ See *id.*; Sam Kessler, *The Ethereum Merge Is Done, Opening a New Era for the Second-Biggest Blockchain*, CoinDesk (Sept. 15, 2022, 2:43 A.M.), <https://www.coindesk.com/tech/2022/09/15/the-ethereum-merge-is-done-did-it-work/>.

⁹ Carl Beekhuizen, *Ethereum's Energy Usage Will Soon Decrease by ~99.95%*, Ethereum (May 18, 2021), <https://blog.ethereum.org/2021/05/18/country-power-no-more>.

computing power is no longer a barrier to entry. The cost of maintaining the blockchain is lower, because the blockchain can offer less compensation while still attracting users to participate in block creation. And the blockchain is more secure because users who attempt to manipulate the block-creation process risk seizure of their stake, a feature without analog in a Proof of Work system.¹⁰

While we appreciate the Commission’s interest in ensuring the integrity of digital asset markets and managing climate-related financial risk, the foregoing innovations demonstrate the industry’s ability to improve over time and without regulatory intervention. Indeed, Proof of Stake creates a powerful incentive toward the creation and use of more environmentally responsible blockchains, and we believe that future network verification methodologies will offer further improvements as well.¹¹ Given the industry has already made strides in solving an important environmental challenge associated with early blockchain technologies, the Commission should allow that innovation to unfold further before intervening, because such intervention could unintentionally thwart positive developments in this industry.

III. Blockchain Technology Can Be Leveraged to Address Carbon Emissions Across Industries

In addition to reducing its own carbon emissions, blockchain technology also offers tools for combating carbon emissions across industries. Two examples relating to ESG reporting and carbon offsets illustrate the point.

ESG reporting. ESG reporting encompasses three categories of emissions: Scope 1, Scope 2, and Scope 3. Scope 1 measures the emissions directly caused by the firm’s production of goods or services. Scope 2 measures the emissions resulting from utilities’ provision of energy to the company. And Scope 3 measures supplier and customer emissions indirectly attributable to the company.

¹⁰ Ali Yahya, *What the Merge Means*, Andreessen Horowitz (Sept. 15, 2022), <https://a16zcrypto.com/what-the-merge-means/>.

¹¹ For more information about other blockchain network verification processes, see *Consensus Mechanisms in Blockchain: A Beginner’s Guide*, Crypto.com (May 13, 2022), <https://crypto.com/university/consensus-mechanisms-in-blockchain>.

ESG reporting is an important mechanism for holding companies accountable for their greenhouse gas emissions and for disincentivizing inefficient uses of energy. But such reporting is valuable only to the extent the relevant data is accurate and available. While Scope 1 emissions are relatively easy to track, Scopes 2 and 3 are not. Companies typically obtain Scope 2 data directly from their utilities, but utilities' measurements are not necessarily precise or available. For instance, utilities often measure the energy usage of large commercial buildings as a whole, but energy usage may vary greatly by tenant. And whatever data the utility collects may be sent only to the building owner, not to the tenants, further complicating companies' ability to accurately report their Scope 2 emissions. Scope 3 emissions are even more difficult to determine, given the inherent challenges associated with attempting to estimate and assign third-party emissions to a particular company.¹²

Blockchain technology, however, can help address these challenges. For Scope 2 emissions, for example, building owners or tenants can use blockchain technology in conjunction with smart sensors to collect and record, in real time, precise measurements of energy usage within specific areas of a building. This enhances the precision of usage data, and also makes such data available to both companies and the public. For Scope 3 emissions, blockchain technologies are currently being used to record transactions in real time and at each step of a supply chain, making it possible to trace the actions of suppliers and shippers back to a particular company.¹³ One example of this technology at work is Cleartrace, a company that monitors emissions through blockchain technology. Cleartrace has partnered with JP Morgan Chase and One Manhattan West, a 67-story office building in New York City, to track their emissions on an hourly basis so that they can execute their plans to transition to net-zero carbon emissions.¹⁴ While these examples are illustrative, they underscore the new and emerging roles blockchain technology can play in combating carbon emissions.

¹² *Getting the Built World "In Shape" Through ESG Energy Data*, Vutiliyu (June 28, 2022), <https://vutility.com/blog/esg-blog>.

¹³ See World Econ. Forum, *Building Block(chain)s for a Better Planet* 14–17 (2018), https://www3.weforum.org/docs/WEF_Building-Blockchains.pdf.

¹⁴ Press Release, *Blockchain Project to Help JPMorgan Reach 100% Renewable Energy Goal*, <https://cleartrace.io/press-releases/jpmorgan-renewable-energy-goal/> (last visited Sept. 22, 2022); Press Release, *Brookfield Renewable to Provide Electricity from its New York State Hydropower Facilities*, Cleartrace (Mar. 21, 2022), <https://cleartrace.io/press-releases/brookfield-properties-one-manhattan-west-to-be-powered-by-100-percent-renewable-energy/>.

Carbon Offsets. Blockchain technology also has an important role to play with respect to carbon offsets. Carbon offsets represent reductions of carbon emissions that are intended to offset emissions produced by an entity. The market for carbon offsets is largely unregulated, making it easy for entities to purchase and claim offsets that either have a dubious connection to bona fide reductions in carbon emissions, or have already been claimed.¹⁵ But by using a token (*i.e.*, a digital asset) on a blockchain to represent a carbon offset, it is possible to establish an inalterable, publicly available provenance for carbon offsets. This allows the public to determine whether an offset claimed by a firm comes from a legitimate source and whether it has been previously claimed.

Blockchain technology's ability to improve the market for carbon offsets inspired our investment in Flowcarbon, a company dedicated to developing tokens for reliable, voluntary carbon offsets. More specifically, off-chain carbon credits are tokenized into GCO2 tokens that are unique to each project and vintage year from which the credits are sourced. GCO2s are then added to a bundle with other GCO2s that have similar characteristics, and a fungible GNT token is minted from the bundle. Another example is our investment in the Celo blockchain, which is a carbon-negative blockchain. Celo contributes daily offsets through the network protocol, making the operational resources powering the Celo platform carbon-negative from the outset.¹⁶ It also inspired the International Finance Corporation, a subsidiary of the World Bank, to establish a global investment fund "that will raise private capital for an innovative model to source, tokenize and sell high-quality, verified carbon credits."¹⁷ As these efforts suggest, blockchain technology can be leveraged to enhance the integrity of carbon offsets and, in that way, contribute to a net-zero carbon future. But because these efforts are still nascent, there is considerable value in allowing the technology to continue to progress, unimpeded by the potential unintended consequences of premature regulatory intervention.

¹⁵ See Request for Information on Climate-Related Financial Risk, 87 Fed. Reg. 34,856, 34,861 (June 8, 2022) (statement of Comm'r Goldsmith Romero).

¹⁶ To date, Celo has offset 2,285 tons of carbon, and it expects additional funds already set aside by the protocol to offset a further 4,696 tons. See *A Carbon Negative Blockchain? It's Here and it's Celo*, Celo Foundation (May 26, 2021), <https://blog.celo.org/a-carbon-negative-blockchain-its-here-and-it-s-celo-60228de36490>.

¹⁷ Press Release, *Carbon Opportunities Fund Launches First-of-its-Kind Investment Platform to Issue Tokenized Carbon Credits*, Int'l Fin. Corp. (Aug. 17, 2022), <https://pressroom.ifc.org/all/pages/PressDetail.aspx?ID=27145>.

IV. Blockchain Technology Supports High-Paying American Jobs and is Critical to American Technology Leadership and Values

Blockchain technology also provides important benefits beyond helping reduce carbon emissions. In the same executive order that established mitigating climate-related financial risk as a policy of the federal government, President Biden stressed the need for “spurring the creation of well-paying jobs” and “position[ing] the United States to lead the global economy.”¹⁸ Blockchain technology does both. Although it is difficult to derive precise figures in such a nascent and fast-changing industry, the demand for jobs relating to blockchain and web3 appears to be “skyrocketing.”¹⁹ According to LinkedIn’s internal data, job postings relating to blockchain and web3 grew by 395% between 2020 and 2021, a growth rate more than four times greater than postings for the tech industry as a whole, which grew by 95% over the same time period.²⁰ And evidence suggests that these jobs pay well and span diverse industries. The average annual salary for a blockchain developer, for example, is \$129,221,²¹ with blockchain penetrating industries ranging from identity management,²² enterprise,²³ media and content creation,²⁴ online gaming,²⁵ and data storage.²⁶ Notably, blockchain technology creates jobs in the energy management systems (EMS) sector as well, which is a large and growing sector of the American economy, with a current size of \$70 billion and an annual growth rate of 12%.²⁷

Web3 also protects American values, such as freedom, individualism, and free and competitive markets. Blockchain analytics firm, Chainalysis, recently published a report on the

¹⁸ Climate-Related Financial Risk, E.O. 14,030, § 1, 86 Fed. Reg. 27,967, 27,967 (May 20, 2021).

¹⁹ Post of LinkedIn News (Jan. 2022), https://www.linkedin.com/posts/linkedin-news_theworkshift-economy-labormarket-activity-6887062336839016450-67iT/.

²⁰ *Id.*

²¹ *Blockchain Developer Salary*, ZipRecruiter, <https://www.ziprecruiter.com/Salaries/Blockchain-Developer-Salary> (last visited Sept. 22, 2022).

²² See, e.g., [Spruce Systems](#).

²³ See, e.g., [IBM](#), [Maersk](#), and [J.P. Morgan](#).

²⁴ See, e.g., [ADIM](#), [ARpeggi](#), [CreatorDAO](#), [Royal](#), [Sound.xyz](#), and [Tally Labs](#).

²⁵ See, e.g., [Axie Infinity](#), [Azra](#), [Battlebound](#), [BreederDAO](#), [Clockwork Labs](#), [Irreverent Labs](#), [League of Kingdoms](#), [Yield Guild Games](#), and [Zed](#).

²⁶ See, e.g., [Arweave](#).

²⁷ *How Blockchain Improves the Energy Management Systems Sector*, Investing News Network (May 2, 2018, 2:00 PM), <https://investingnews.com/innspired/using-blockchain-to-improve-the-energy-management-systems-sector/>.

increased use of digital assets among young people in Sub-Saharan Africa, who are turning to blockchain as a “way to preserve and build wealth in spite of low economic opportunity.”²⁸ Latin Americans have similarly taken advantage of blockchain technology through decentralized finance,²⁹ while Afghans, who have been unable to withdraw cash from banks in the wake of the Taliban takeover, have successfully received emergency aid in cryptocurrencies.³⁰ And community-owned and operated web3 data storage provider, Arweave, is using blockchain-enabled networks to archive millions of documents from Ukraine, generating immutable historical records of Russia’s human rights abuses and war crimes.³¹ In the future, web3 applications will continue to play a critical role in giving dissidents, informants, activists, journalists, and regular people tools to protect themselves from oppressive regimes.

Finally, we note that the United States has been a global leader in technology and innovation, with many of the world’s most prominent online platforms concentrated in this country. But we cannot take the United States’ leadership for granted. Many of our country’s adversaries, including Russia, China, Iran, and Venezuela, are developing government-backed blockchain protocols that pose serious national security threats. Such protocols could provide the associated foreign government with access to personally identifiable information, sensitive financial data, and data on shipping and cargo flows (for enterprise blockchains and, potentially, payment blockchains). It is therefore a national security imperative to lead technological innovation.³² As long as the industry develops responsibly, any regulatory interventions should be cautious, measured, and appropriately timed, to ensure that the full power and potential of American ingenuity can preserve the United States’ leadership and security in this new era of technology.

²⁸ See Chainalysis Team, *How Cryptocurrency Meets Residents’ Economic Needs in Sub-Saharan Africa*, Chainalysis (Sept. 29, 2022), <https://blog.chainalysis.com/reports/sub-saharan-africa-cryptocurrency-geography-report-2022-preview/>.

²⁹ See Marina Lammertyn, *Crypto Loans Are Booming in Latin America Amid Runaway Bank Rates and Inflation*, CoinDesk (Sept. 29, 2022), <https://www.coindesk.com/business/2022/09/29/crypto-loans-are-booming-in-latin-america-amid-runaway-bank-rates-and-inflation/>.

³⁰ See Joshua Zitser, *Impoverished Afghan Women Are Receiving Emergency Aid in Crypto as the Taliban Limits Cash Withdrawals And Millions Go Hungry*, Business Insider (Jan. 23, 2022), <https://www.businessinsider.com/afghanistan-women-turn-to-cryptocurrency-to-feed-their-families-2022-1>.

³¹ Hannah Miller, *Crypto Network Promises Hack-Proof History of Ukraine Attack*, Bloomberg (Feb. 25, 2022), <https://www.bloomberg.com/news/articles/2022-02-25/ukraine-invasion-videos-amass-on-crypto-data-storage-network?sref=rAbB2JNU>.

³² Thesis, a16z Crypto, <https://a16zcrypto.com/> (last visited Sept. 22, 2022).

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We again thank the Commission for seeking public input on climate-related financial risks. We believe that blockchain technology is already helping to accomplish the Commission's worthy goals under the present regulatory environment and that the best approach is to stay the course.

Very truly yours,

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a16z

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cc: The Honorable Rostin Behnam, Chairman
The Honorable Kristin N. Johnson, Commissioner
The Honorable Christy Goldsmith Romero, Commissioner
The Honorable Summer K. Mersinger, Commissioner
The Honorable Caroline D. Pham, Commissioner
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