

May 9, 2022

Re: Notice of Request for Information on the Energy and Climate Implications of Digital Assets.

Dear Acting Director Nelson,

On behalf of Public Citizen and Americans for Financial Reform, we appreciate the opportunity to comment on the Office of Science and Technology Policy's (OSTP) Request for Information on the Energy and Climate Implications of Digital Assets ("the Request"). Digital assets, like many new technologies, are presented as the solution to intractable problems of financial inclusion, privacy, and increasingly, climate change. But these highly volatile digital assets often exacerbate existing energy and climate concerns, as well as racial inequities.

OSTP should make robust recommendations to the President as well as financial regulators on accounting for the climate impacts of energy waste caused by digital assets, adopting an appropriate level of skepticism regarding the ability of blockchain technology to address the challenges of verifying carbon offsets, incorporating the climate impact of digital assets into the Securities and Exchange Commission's climate disclosure rule, and broadly accounting for the ways digital assets raises energy costs and create financial risks for communities already burdened by racial inequity and multi-generational racism. Ultimately, the risks posed by digital assets are likely to outweigh any climate or energy benefits they may provide.

The climate impacts of digital assets extend past the direct emissions generated by their operations, including to the waste they produce.

Much of the attention focused on the energy and climate-related impacts of digital assets relates to the energy use and direct emissions of the proof-of-work protocol. Although these impacts are important, OSTP should recognize that the energy and climate impacts of digital assets extend into a number of topics that have not received the same coverage.

For instance, similar attention should be paid to the carbon emissions resulting from mining operations' dependence on the manufacturing and supply of electronic equipment. Crypto mining and proof of work verification methods generate disproportionately high volumes of electronic waste (or "e-waste") for the type of 'meaningful' economic activity that crypto mining purports to represent. The emissions resulting from the manufacture of this equipment may match or even exceed the emissions directly attributable to mining. One study has estimated the annual e-waste generated globally by mining for Bitcoin alone as roughly 30.7 metric kilotons in 2018, roughly equivalent to the amount of small IT equipment e-waste generated by the Netherlands.¹ One average Bitcoin generates 272 grams of e-waste per transaction, the equivalent of throwing away an iPad for every two Bitcoin transactions.² At peak price levels, Bitcoin mining could produce up to 64.4 metric kilotons of e-waste annually.

The main driver of this e-waste is that the typical ASIC processor used for Bitcoin mining can operate at an intensity sufficient to be profitable for only 1.29 years. This planned obsolescence on steroids will, barring both fundamental changes in mining technology and an incentive structure to change this

¹ [Bitcoin's growing e-waste problem - ScienceDirect](#)

² [E-waste from every two bitcoin transactions is the equivalent of throwing away an iPad](#)

approach, virtually guarantee a steady stream of electronic waste so long as crypto currencies exist and use processing intensive verification methods such as proof-of-work.

Noted digital technology developer and digital historian David Rosenthal has estimated that the carbon footprint of bitcoin mining, when taking into account released carbon emissions from the manufacture and use of these electronics, could be two times or even ten times larger than estimates that focus primarily on mining's energy use alone.³

For broader context, the creation, collection, disposal of electronic waste is a decades long global resource and environmental health concern. The US generates a significant amount of e-waste – 6918 kilotons in 2019 alone, which works out to approximately 21 kilograms of e-waste generated per capita annually. Of that, only 15% is recycled.⁴ Given this high volume of waste and the challenges that come with managing it, the economic and operational costs of collecting e-waste have historically put undue strain on local waste management facilities. Improper disposal, handling, disassembly, or incineration of e-waste can also release toxic metals and chemicals into the local environment, which can have significant negative health impacts on waste management workers and local communities, as well as local air and water quality.

Roughly half of US states have some sort of e-waste recovery laws to establish producer responsibility for the end of life of their products, but these laws vary widely in scope, coverage, and incentivization.⁵

Although the volume of e-waste generated by crypto mining to date is likely modest in comparison to the overall volume generated in the US, policy makers and regulators should consider what the electronic waste implications of crypto mining operations would be, should crypto assets achieve mainstream use, either as a tool for investment or speculation. The volume of waste would no doubt achieve new levels of magnitude. Local and state waste recovery and recycling programs would face significant operational and financial strain managing such waste. State laws would need to be amended to ensure crypto mining operations fall under the scope resource recovery laws that deal with e-waste – or, in states where no such rules exist, entirely new requirements might need to be created to deal with this new waste stream.

At a minimum, federal regulators should seek more concrete data from industry and state and local authorities on e-waste streams associated with crypto mining operations. They should also coordinate with state and local lawmakers to engage crypto mining operations to gauge the industry awareness of and intention to comply with efforts at all levels of government to safely recover and recycle electronic waste associated with crypto mining.

Blockchain based carbon offset credits cannot address the issues with carbon credits and indeed create new challenges.

In recent months, Decentralized Finance (DeFi) projects have launched, claiming to employ the blockchain to create a forum for trading carbon offset credits and to improve transparency and liquidity in those markets.⁶ The largest project, known as Toucan, claims it has put more than 17 million tons of CO₂-equivalent avoided emissions “on chain.” But recent research by the climate

³ [DSHR's Blog: Cryptocurrency's Carbon Footprint Underestimated](#)

⁴ [The Global E-waste Monitor 2020](#)

⁵ [The Global E-waste Monitor 2020](#)

⁶ [Cryptocurrency Traders Move Into Carbon Markets - WSJ](#)

solutions watchdog Carbon Plan shows that while this project has apparently been lucrative for its backers and partners, there is little evidence that it has effectively reduced emissions.⁷ The offsets it puts on chain are subject to well-documented problems, which mean that the verified credits are unlikely to actually reduce emissions. And because the protocol denies responsibility for further verifying credits, it actually revives projects that have previously been unable to find buyers or that are no longer eligible for trading on off-chain markets.

The stated goal of Toucan is to create liquidity and increase price discovery through transparency in voluntary carbon markets, which would raise prices for credits from voluntary emissions reductions. If successful, proponents claim it would incentivize greater emissions reductions in the physical world. The protocols operate by allowing anyone who currently holds emissions credits with the Verra offsets registry to move those credits onto the blockchain.

But using blockchain for carbon offset trading is a solution in search of a problem: neither liquidity nor price discovery are current problems in the functioning of the carbon markets; the overarching problem is poor offset quality.⁸ Most voluntary emissions reduction projects struggle to demonstrate that they actually reduce emissions. Instead, they often pay managers of forests or other carbon sinks to continue doing what they were already doing.⁹ At best, this approach means a project has no effect on carbon emissions. Worse, in some cases it actually justifies increased emissions. This is because when business-as-usual management of a carbon sink is treated as an “offset,” it increases the pool of allowable emissions without any corresponding real-world offset or reduction. A recent effort by global financial leaders to improve the integrity of these markets has become bogged down in these challenges.¹⁰

The garbage in - garbage out problem that this state of affairs creates is only exacerbated by Toucan’s expansive eligibility criteria. Carbon Plan has documented that, rather than incentivizing production of new, high quality offsets, the Toucan protocol largely gives new life to “zombie projects” that have been unable to sell credits for years, likely due to their low quality standards. 99.9 percent of credits on Toucan reflect projects that were credited before 2016, making them ineligible for trading in most conventional markets. Rather than taking responsibility for these negative consequences, Toucan has insisted they are not responsible for judging the quality of carbon credits on their blockchain.¹¹ Naturally, Verra has disclaimed any responsibility for any trading that happens on Toucan. The result is that buyers of credits get to claim non-existent emissions reductions, while sellers make a quick profit on previously worthless carbon credits.

The blockchain may yet prove to have benefits for tracking emissions and reductions. But in assessing the potential for digital assets to yield positive climate impacts, OSTP should keep in mind that these projects have a track record of failing to recognize, much less trying to address the challenges posed by the real world. Before endorsing blockchain based approaches or encouraging the entry of new digital assets in this space, the administration must thoroughly understand the underlying challenges and how entrants would address them in a durable fashion.

⁷ [Zombies on the blockchain – CarbonPlan](#)

⁸ [Public Citizen Comment on Office of the Comptroller of the Currency’s Principles for Climate-Related Risk Management for Large Banks](#), pp 10-13

⁹ [Rethinking forest carbon offsets; JPMorgan, Disney, Blackrock Buy Nature Conservancy’s Useless Carbon Offsets.](#)

¹⁰ [Mark Carney’s Bid to Boost Carbon Market Scaled Back Amid Controversy - Bloomberg](#)

¹¹ [Toucan’s Huge Crypto Effort to End Useless Carbon Offsets Is Backfiring - Bloomberg](#)

To adequately monitor the climate risks posed by digital assets, the administration should encourage the Securities and Exchange Commission (SEC) to adopt robust emissions disclosure requirements.

Both the e-waste impacts of crypto mining and the use of digital assets in carbon offsets markets reveal gaps and contradictions in the claimed and actual climate impacts of digital assets. Both regulators and owners of digital assets lack standardized, comparable information about these and other climate impacts. As ownership of digital assets becomes widespread and the industry becomes embedded in public markets in new and complex ways, it exposes the financial system to a largely unmonitored source of transition risk, which is the impacts on a company, institution or sector attributable to regulatory, technological and market changes to address the mitigation of, or adaptation to, climate change.¹² The SEC's climate disclosure rule, if adopted, could provide a comprehensive, verified view of the emissions generated by digital assets and trading, especially if the rule requires registrants to disclose the emissions released in their value chain, also known as Scope 3 emissions. Along with the immediate benefits to investors, such disclosures would also provide important inputs to systemic financial risk monitoring conducted by the Office of Financial Research and the Financial Stability Oversight Council, which has highlighted both climate and digital assets as emerging risk areas.¹³

The decentralized, anonymized nature of the blockchain makes it difficult to develop a systematic understanding of the overall energy usage or climate risks of any given digital assets, much less the entire ecosystem. What information exists today is often based on academic modeling that employs a wide range of estimates and simplifying assumptions regarding the energy mix used to power the consensus mechanism.¹⁴ Some estimates of energy mix come from surveys of participants, which are not subject to rigorous external verification.¹⁵ The analysis conducted as a result of the Request may broaden the understanding, but it is unlikely to generate systematic, reliable information on the emissions of miners and specified protocols. Indeed, there is a clear incentive for stakeholders to withhold this information or underestimate emissions and risks and overestimate climate benefits. Purposeful obfuscation is the present norm.¹⁶

The loosely monitored and lightly regulated climate impacts of digital assets pose an underappreciated financial risk to users and potentially to the financial system. Digital assets are heavily exposed to transition risks. For instance, the Request mentions that many digital assets are looking into less energy-intensive consensus mechanisms than proof of work.¹⁷ Recently, some governments have begun to advance proof of work pauses or bans.¹⁸ If this trend continues, it will threaten the value and utility of digital assets that still use that protocol. The mining space is also full of bold claims about climate friendliness, even from miners powering their operations with coal refuse or flared natural gas.¹⁹ This mismatch between words and deeds could result in additional transition risks as the public learns more about the sector's climate and environmental impacts.

¹² [The Enhancement and Standardization of Climate-Related Disclosures for Investors](#)

¹³ [2021 Annual Report of the Financial Stability Oversight Council](#)

¹⁴ [Cambridge Bitcoin Electricity Consumption Index](#); [The carbon footprint of bitcoin](#) at 12.

¹⁵ See [3RD GLOBAL CRYPTOASSET BENCHMARKING STUDY](#) at 29.

¹⁶ [How Crypto Is Failing Spectacularly to Greenwash Itself](#); <https://carbonplan.org/research/toucan-crypto-offsets>

¹⁷ See [The Enhancement and Standardization of Climate-Related Disclosures for Investors](#) at 17106

¹⁸ [NY State Assembly Bill A7389C](#)

¹⁹ [Crypto Mining Company Welcomes SEC Environmental Reporting Proposal](#); [Exxon is mining bitcoin in North Dakota as part of its plan to slash emissions](#)

Unfortunately, owners and users of digital assets are not required or able to account for these sorts of transition risk, due to the lack of any standard methodologies or products for disclosure and analysis. The rapid growth and adoption of digital assets makes this a particularly dangerous blind spot. Many mainstream Wall Street firms are increasingly trading and lending digital assets,²⁰ and large miners like Stronghold Digital Mining and exchanges like Coinbase have been publicly listed on US stock exchanges. Investors and other market participants lack the information to fully assess the intersection of financial risks and climate impacts.²¹ Retail and institutional investors who purchase digital assets, many of which may be securities, are not being properly appraised of these risks, which threatens the orderly and efficient functioning of the capital markets.

The SEC's proposed climate disclosure rule provides an important avenue for giving investors and other market participants, including regulators, the information they need to assess this risk. The rule would require public companies to disclose their climate-related risks. Digital asset miners, exchanges, and owners that are publicly traded would all need to assess their business and publicly disclose the way their business could be affected by the energy transition. Unfortunately, qualitative disclosures sometimes devolve into boilerplate, but the climate disclosure rule would include an important quantitative component to anchor reporting: disclosure of GHG emissions from their activities (Scope 1 and 2 emissions), and, in some cases, from the activities in their value chain and investments (Scope 3).

Disclosure of Scope 1 and 2 emissions would provide information about the emissions of publicly traded miners. This would provide investors and other market participants with a picture of the heterogeneity of energy use and emissions by different miners and protocols, and help substantiate or debunk claims about the emissions generated by their activities. Investors could choose how to allocate their capital with full information about the potential transition risks faced by a set of miners involved in each protocol. These emissions disclosures would be subject to outside assurance requirements and attestation by management.

Perhaps even more important for assessing the emissions of digital asset protocols would be the Scope 3 disclosures. Major exchanges hold a near oligopoly on the trading of some cryptocurrencies.²² Coinbase, one of the largest, is publicly traded, and others may follow suit as regulation of digital assets continues to develop. As part of their business, these exchanges own the digital assets they offer for trade.²³ Requiring disclosure of the emissions from their investments would make those exchanges assess and report the emissions impacts of each protocol they trade in. To appropriately capture this information, exchanges and financial institutions would need to establish processes for assessing the emissions from the main miners, regardless of their location or ownership status. Such processes would illuminate the level of transition risk embedded in digital assets, providing both investors and regulators with the picture they need to choose whether to invest in specific digital assets or in the firms that own or trade them.

To realize these benefits, it's important that the SEC clarify the reach of its proposed Scope 3 reporting requirement, which currently only requires disclosure if those emissions are "material." Ideally, the SEC would recognize the importance of Scope 3 emissions disclosure for all companies

²⁰ [Wall Street Reluctantly Embraces Crypto - WSJ](#)

²¹ [Crypto Miners Struggle to Cut Carbon Emissions - WSJ](#)

²² [Crypto Oligopoly Imminent as Top Exchanges Grab 96% Market Share](#)

²³ [Coinbase's crypto holdings jumped ninefold last year to over \\$300 million as bitcoin surged](#)

and remove that requirement. But, at a minimum, it should clarify that for large firms who own or trade significant quantities of cryptocurrency, their Scope 3 emissions would be material and subject to disclosure for the reasons discussed above. Due to their importance, those emissions should also be subject to the level of assurance required for Scope 1 and 2 emissions.

This rule's adoption and application to the digital assets industry would trigger positive changes by improving accountability and transparency. To smooth the transition process, we encourage the SEC, the Department of Treasury, and OSTP to work with the industry to develop methods for assessing the emissions impacts of digital assets in ways that can be implemented, monitored and verified with confidence.

The claimed financial inclusion benefits of digital assets overshadow the real costs they threaten to impose on already burdened communities.

The relocation of digital asset mining to low energy cost states threatens to disproportionately harm Black communities. According to the Global Energy Institute, in 2020, states with lowest cost of energy included at least thirteen south of the Mason-Dixon line, nearly all with populations of Black residents higher than the national average.²⁴ Despite low energy costs, Black communities in these states spend some of the highest percentages of their household income on energy of anyone in the US.²⁵ This cost, known as energy burden, overwhelmingly falls on Black Americans nationwide. Nationally, the median energy burden of Black households is 43% higher than the median energy burden of white households.²⁶ At the same time as Black residents are being failed by energy companies and state utility price regulators, southern states are experiencing a boom in the number of digital assets companies relocating to the region to take advantage of low energy costs—thereby driving costs higher. Since 2020 Georgia alone has seen 8 expanded or relocated cryptocurrency mining operations.²⁷ Texas, another low energy cost state with a high percentage of Black residents, has also seen increases in crypto mining activity.²⁸

Studies have shown that crypto mining operations raise electric bills. One 2021 study found that crypto mining operations raised electric bills in small towns in upstate NY by \$8 a month for individuals and \$12 a month for business.²⁹ This may seem like a minor inconvenience, but for families already dealing with low wealth, unstable employment, and irregular shut offs, another \$100 in unnecessary expenses is significant and burdensome.

The relocation of crypto miners to the Southern U.S. may be having just such an effect on electricity prices. The Global Energy Institute's updated 2021 average energy rates by state shows that Georgia has risen to the middle quintile for energy cost after being in one of the bottom two quintiles the prior year. Current trends suggest that these price increases will be disproportionately burdensome to its Black residents. Even as promoters of digital assets tout the financial inclusion benefits of cryptocurrency, utility companies are giving priority to highly volatile assets with unsustainably high energy use and greenhouse gas emissions. States that encourage crypto mining in their borders make it harder for Black residents to meet their basic needs.

²⁴ [This map shows the best states for bitcoin mining](#)

²⁵ [How High Are Household Energy Burdens?](#) at ii

²⁶ [How High Are Household Energy Burdens](#) at 11.

²⁷ [Bitcoin miners descend on Georgia to mint new currency](#)

²⁸ [Crypto miners use natural gas "stranded" in wells to power energy-hungry rigs](#)

²⁹ [When Cryptomining Comes to Town: High Electricity-Use Spillovers to the Local Economy](#)

As discussed above, dumping or improper disposal of electronic waste can also have significant localized impacts on these communities. The establishment of crypto mining operations in rural or poor communities, for example, might mean that local waste management facilities will be poorly equipped to handle this new influx of waste. This also is likely to be true given that many of the states identified as current or potential hubs for bitcoin mining are less likely to have robust electronic waste recovery and recycling infrastructure. For example, New York, Texas, Georgia and Kentucky were named as the states with the highest “hash rates” (a proxy for mining activity) in a 2021 data analysis conducted by leading mining pool Foundry.³⁰ Of these states, only New York has a comprehensive law regarding e-waste. Texas has e-waste laws on the books, but compliance and enforcement is arguably sub-par; while Kentucky and Georgia have no meaningful e-waste recovery laws. Even if local governments do have e-waste recovery and recycling laws in place and the infrastructure to support them, it is less clear whether the manufacturers of mining processors and the mining operators themselves are aware of such laws, understand their application, and will comply.

The economic risks and harms from digital assets are likely to outweigh any direct financial inclusion or climate benefits they promise.

It is imperative that the White House and federal regulators weigh these concrete harms against the flowery, unproven narratives about digital assets being an engine of inclusion and innovation, ostensibly in contrast to traditional financial institutions such as banks and credit card companies, which have a long and shameful history of excluding Black Americans.

It is certainly true that traditional financial companies have a terrible track record with Black American communities. Financial firms were deeply involved in financing, insuring, and profiting from slavery, and Wall Street was the first official slave market in what is now the United States. The transition from property to citizenship was, itself, plagued with discrimination, lack of access to financial services, and denials of rights, including an inability to access financial systems and secure property ownership. What followed was a long chain of exclusion, discrimination, and exploitation that has continued to the present—from the embezzlements of funds from the Freedman’s Bank, to designating Black Americans ineligible for mortgages and capital investments, to consumer credit markets not even attempting integration until the 1970s, to ongoing predatory lending practices, to the continuing failure to provide adequate compensation or redress for the litany of past harms.

But the failure of traditional financial institutions to serve Black Americans says nothing about the likelihood that digit assets will do better. If anything, the record counsels skepticism of sunny claims regarding new financial products or services. But there are plenty of specific reasons for skepticism as well.

First, the claims of inclusion are overblown. Less than a quarter of Black Americans, mostly younger, own some nominal amount of cryptocurrency, whose most valuable token, Bitcoin, is currently at a 6 month loss of 41.55% (as of May 6, 2022).³¹ As is self-evident from that performance, inclusion in these markets may not be a worthy policy goal.

Next, digital asset markets are rife with scams and other manipulative financial practice. Several federal regulators, including the CFPB, SEC, and FTC among others have issued regular alerts warning consumers and investors about the prevalence of scams, hacks and manipulative activities

³⁰ [New York, Kentucky Have the Most Bitcoin Miners in America — How Renewable Energy Concerns Tie In](#)

³¹ [Black, Latino, LGBTQ investors see crypto investments like bitcoin as 'a new path' to wealth and equity](#)

found within the digital asset markets, and have collected data to back up these warnings. Numerous media articles, academic studies and even industry reports have documented the large sums of money lost through these scams and exploitative practices. For example, a recent study by crypto analytics firm Chainalysis found there were \$14 billion in losses in 2021 alone, and that there had been a 79% increase in crypto related crime during that same year.³²

These losses may be the tip of the iceberg; a Better Business Bureau report profiling crypto scams noted that the FTC claims that only about 5% of fraud victims end up reporting their losses or victimization.³³ Tellingly, the FTC has also historically found that Black and Hispanic or Latino Americans are more likely than white Americans to be victims of scams or fraud, and are more likely to under-report such experiences as well.³⁴ This suggests that, even as digital assets are being promoted (via sophisticated marketing campaigns) as vehicles for financial inclusion for communities traditionally excluded from or exploited by traditional financial actors, these same communities may be bearing the brunt of the losses generated by fraud, scams and the industry's "wild west" atmosphere and culture.

Despite the prevalence of such illegal or unethical behavior within the digital asset space, many digital assets and their purveyors are currently operating either in unregulated or under-regulated environments. This means that the various oversight and protection measures currently in effect for traditional financial markets and actors—whether it be broker-dealer registration, disclosure requirements, liquidity or capital requirements, consumer warnings, or many other protocols—are largely not available for those trading or investing in digital assets. Most BIPOC investors and consumers on average already have less wealth and less income than white Americans and generally experience a comparative lack of access to information, advice, capital and other measures that better equip white investors to navigate risky financial activities, absorb losses, and seek redress for unfair practices. This may mean that those BIPOC individuals seeking to own, trade or invest in digital assets have the most to gain from these protections when they are in effect, and the most to lose when they are not.

Finally, scholars and financial regulators have also raised concerns that the rapid rise of unstable, risky crypto assets, their lack of meaningful regulation, and "irrational exuberance" in the digital asset industry could create conditions that might lead to another major financial crisis.³⁵ As we know from extensive research, by many measures BIPOC Americans generally fared worse financially during and after the 2008 financial crisis than white Americans.³⁶ The legacy of inequality persists today, and despite the enactment of measures to close this wealth gap and remedy the circumstances that contributed to that crisis and its disproportionate impact on historically marginalized communities, the work is still very much in progress. A future financial crisis precipitated by the risky, unstable, ethically murky and under-regulated digital assets industry would likely again fall harder on BIPOC individuals and communities.

In the context of the climate crisis, when low-income and BIPOC communities—who, as above, already face major gaps in wealth and income compared to more affluent communities and

³² [The Chainalysis 2022 Crypto Crime Report](#)

³³ [Cryptocurrency Scams Full Study](#)

³⁴ [Combating Fraud In African American & Latino Communities: The FTC's Comprehensive Strategic Plan: A Federal Trade Comm](#)

³⁵ [DeFi: Shadow Banking 2.0? by Hilary J. Allen :: SSRN; Crypto could cause 2008-level meltdown, Bank of England official warns](#)

³⁶ [The Great Recession, education, race, and homeownership | Economic Policy Institute](#)

demographics—sustain major financial losses due to speculative and unethical behavior and poor regulatory oversight within financial markets, they are less able to recover from such losses and sustain the economic harm from climate change. And governments responding to the financial impact of economic downturns—including those that may be derived from contractions due to crypto bubbles—will have fewer resources to devote to climate resilience efforts and energy transition efforts.

The American economy can ill-afford an economic crisis in the midst of a climate crisis, especially one fostered by digital assets that have yet to demonstrate meaningful economic value beyond serving as a tool for financial speculation that benefits a relatively small number of wealthy investors, usually at the expense of other retail investors.

Thank you for your time and attention to these important issues. To discuss these issues further, please contact Yevgeny Shrago, Policy Director at Public Citizen’s Climate Program (yshrago@citizen.org) and Mark Hays, Senior Policy Analyst at Americans for Financial Reform Education Fund (markhays@ourfinancialsecurity.org).

Sincerely,

Public Citizen and Americans for Financial Reform Education Fund